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DESIGNING AND CONDUCTING HEALTH SYSTEMS RESEARCH PROJECTS

Corlien M. Varkevisser
Indra Pathmanathan
Ann Brownlee

Health Systems Research Training Series

Volume 2 Part 1

IDRC
CANADA

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La edicion espanola de esta publicacion también se encuentra disponible.

HSR Training Series

Volume 2: Designing and Conducting Health Systems Research Projects

Part I: Proposal Development and Fieldwork

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Part I: Proposal Development and Fieldwork

Designing and Conducting Health Systems Research Projects

Health Systems Research Training Series
Volume 2

Corlien M. Varkevisser
Indra Pathmanathan
Ann Brownlee

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Abstract

This is the second volume of a five-volume Health Systems Research (HSR) Training Series which has been compiled by a Technical Working Group supported by IDRC and WHO. Each volume is directed toward a particular target group and each addresses specific aspects of the HSR process. Volume 2, in modular format, is the pivotal one which deals step-by-step with the development of an HSR proposal and field testing (Part I), and with data analysis and report writing (Part II). Course participants will select, preferably in advance of the course, priority health problems particular to their own situations that cannot be solved unless more information is collected. In most cases, a team of course participants will then carry out the planned research alongside their regular duties. A second workshop is then scheduled to provide information on data analysis, report writing, and utilization of results. This volume will be of interest to all target groups and especially to those health-care managers and researchers who wish to conduct HSR projects.

The other volumes in the series are: volume 1, which focuses on the need to promote the use of HSR as management tool and reviews strategies for promoting HSR among policymakers and senior managers; volume 3, a review of strategies that can assist universities or research institutes to initiate and implement multidisciplinary HSR programs; volume 4, a course outline in modular format designed to provide research managers with the skills for managing a program of HSR; volume 5, a course outline in modular format, designed to assist those whose primary responsibility is organizing and conducting training courses for the relevant target groups.

The series is designed to support a program of essential national health research. Users are encouraged to critically examine the materials and to choose or adapt them to their particular needs.

Résumé

Ce volume est le deuxième d'une collection de cinq volumes de formation à la recherche sur les systèmes de santé (RSS) qui ont été rassemblés par un groupe de travail technique financé par le Centre de recherches pour le développement international et l'Organisation mondiale de la santé. Chaque volume est destiné à un groupe particulier et chacun porte sur certains aspects de la recherche sur les systèmes de santé. Le volume 2, sous forme modulaire, est le volume central qui expose, étape par étape, la manière de formuler une proposition de RSS et de la mettre à l'essai (partie I) et d'analyser les données et de rédiger un rapport (partie II). Les participants des cours choisiront, de préférence avant les cours, les problèmes de santé qui sont prioritaires pour eux dans leur travail et qui ne pourront être résolus sans un supplément d'information. Dans la majorité des cas, les participants sont groupés en équipes pour faire la recherche planifiée en plus de leurs tâches ordinaires. Un second cours est ensuite organisé sur l'analyse de données, la rédaction de rapports et l'utilisation des résultats. Ce volume intéressera tous les groupes cibles et surtout les gestionnaires de soins de santé et les chercheurs de ce domaine qui veulent exécuter des travaux de recherche sur les systèmes de santé.

Les autres volumes de la collection sont les suivants: le volume 1 traite de la nécessité de promouvoir la RSS comme outil de gestion. Y sont décrites les stratégies propres à cette promotion auprès des décideurs et des cadres supérieurs. Le volume 3 vise à aider les chercheurs de formation universitaire qui travaillent dans des universités ou des instituts de recherche et qui veulent promouvoir des programmes multidisciplinaires de RSS et y participer. Le volume 4 est un guide de gestion d'un programme de RSS. Le volume 5 aidera les personnes chargées d'organiser et de donner des cours de formation aux divers groupes cibles.

Ces cinq volumes ont pour but d'appuyer la création d'un programme national de recherche essentielle en santé. Les personnes qui s'en serviront sont incitées à les examiner d'un oeil critique et à en tirer ce qui répond à leurs besoins ou y répondrait après adaptation.

Resumen

Este es el segundo de cinco volúmenes de una serie de capacitación sobre Investigación de Sistemas de Salud (ISS), compilada por un Grupo de Trabajo Técnico que recibió el apoyo del Centro Internacional de Investigaciones para el Desarrollo (CIID) y la Organización Mundial de la Salud (OMS). Cada volumen está dirigido hacia un grupo particular y trata de aspectos específicos del proceso de ISS. El Volumen 2, en formato modular, es un elemento fundamental que trata progresivamente del desarrollo de una propuesta de ISS y su prueba sobre el terreno (Parte I). Asimismo, se trata en este volumen el análisis de datos y la redacción de informes (Parte II). Los participantes del curso seleccionarán, preferentemente con antelación al curso, problemas de salud prioritarios, específicos de sus propias situaciones e imposibles de resolver hasta que no se recopile más información. En la mayoría de los casos, un equipo de participantes del curso llevará a cabo la investigación planificada conjuntamente con sus deberes regulares. A continuación se programa otro seminario para proporcionar información sobre análisis de datos, redacción de informes y utilización de resultados. Este volumen será de interés para todos los grupos específicos y especialmente para los administradores de establecimientos de salud e investigadores que deseen realizar proyectos de investigación sobre sistemas de salud.

Los otros volúmenes en la serie son: volumen 1, centra su atención en la necesidad de promover el uso de ISS como instrumento de gestión. Asimismo, describe las estrategias para promover la ISS entre ejecutivos y gerentes principales; volumen 3, concebido para ayudar a los investigadores con educación universitaria que trabajan en universidades o institutos investigativos que deseen promover y participar en programas multidisciplinarios de ISS; volumen 4, guía para la gestión de un programa de ISS; volumen 5 servirá de ayuda a aquellos cuya responsabilidad primaria sea organizar y dictar cursos de capacitación para los grupos meta pertinentes.

La serie está diseñada para apoyar un programa esencial de investigación sobre salud a nivel nacional. Se exhorta a los usuarios a examinar críticamente los materiales y/o adaptarlos a sus necesidades particulares.

ACKNOWLEDGMENTS

The present volume, *Designing and Conducting Health Systems Research Projects*, has its roots in the course materials developed in the early 1980s by the Project for Strengthening Health Delivery Systems (SHDS), at the request of the World Health Organization's (WHO) Regional Office for Africa (AFRO).

These materials were very popular and have been widely applied in workshops in western and central Africa, as well as in other parts of the world, to train health staff in developing and implementing problem-oriented research proposals. Nevertheless, modifications were necessary. It was felt that the content should be more adapted to meeting information needs for decision-making at the different levels of the health system and that a larger variety of research methods than offered in the original course should be presented. Modules 1-17 in this volume are heavily adapted or new versions of the original SHDS modules. Furthermore, the need was recognized to support course participants beyond the point of developing a research proposal, through the phases of fieldwork, data analysis, and report writing. Therefore, an additional set of modules was developed (Modules 18-32).

This adaptation and extension took place in the WHO Subregional Office III, Harare and the Public Health Institute of Kuala Lumpur, Malaysia, at first independently and soon in close collaboration through WHO/HQ/HSR.

In Harare, the Joint HSR Project (a joint enterprise of WHO and the Royal Tropical Institute, Amsterdam, supported by the Netherlands Ministry for Development Cooperation) which promotes health systems research in all countries of the southern African region, developed its set of modules with 10 researchers from the region. The Malaysian core group that developed the course material included two Malaysian scientists and a Sri Lankan statistician. These modules were used in numerous workshops in southern African countries, Malaysia, and in other countries and regions from 1988 to 1991, and were revised several times.

Since early 1989, when the International Development Research Centre and WHO HQ took the initiative to support the development of this two-part volume, the different sets of modules have been gradually merged and further developed. Corlien M. Varkevisser (Zimbabwe), Indra Pathmanathan (Kuala Lumpur), and Ann Brownlee (formerly SHDS), who also did the final editing, are responsible for the present version. However, numerous others have contributed as well. First of all, the other members of the Technical Committee, who provided valuable advice and communicated their experiences with training in HSR in other parts of the world; then all those who participated in the development of the modules: L. Omondi (Botswana), M.E. Sebatane and T.K. Makatjane (Lesotho), P. Chimimba and L. Msukwa (Malawi), Maimunah Abdul Hamid and K. Mariappan (Malaysia), A. Kitua and E. Savy (Seychelles), C. Sivagnanasundram (Sri Lanka), G. Tembo (Zambia), R. Munochiveyi, P. Taylor and G. Woelk (Zimbabwe), R. Peeters (Belgium), and, finally, M.W. Borgdorff and L. Bijlmakers (WHO Subregional Office III, Harare), who assisted substantially in the (re)writing of the different versions. Richard Hayes, Betty Kirkwood, and Tom Marshall were so kind as to allow publication of materials used in the MSc course in community health in developing countries at the London School of Hygiene and Tropical Medicine for Modules 28 and 29.

A major input into this process of module development has been provided by the participants and facilitators, named and unnamed, in the various courses that have been part of the exercise. Finally, a great deal of effort was devoted to word processing, editing, formating, proofreading, and all the other painstaking tasks involved in publishing by another group of dedicated people.

To all of the above, thank you.

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FOREWORD

The ultimate goal of any national health-development process is to enable its people to reach a level of health that at least enables them to participate actively in the social and economic life of the community in which they live. To attain this objective, existing health systems must be redirected to achieve equitable reallocation of resources for health - total coverage, increased accessibility to primary health-care services, and effective referral to secondary and tertiary levels of care. It is also relevant to develop appropriate mechanisms to promote effective community participation in the promotion and maintenance of health.

Such redirection of health systems may require changes in health-care planning and government policy; in the organization and administration of health and related services; in the financing and budgeting of systems and procedures; and in the selection and application of appropriate technology.

To effect the necessary changes, countries must decide on the best approaches to adopt. This requires detailed and accurate information on needs, possibilities, and consequences of recommended actions. Such information is often lacking, inadequate, or unreliable. As a result, decisions are based on assumptions and unjustified conclusions and often result in inappropriate policy choices, the consequences of which are only discovered after implementation.

Research is a systematic search for information and new knowledge. It serves two essential and powerful purposes in accelerating advances in health. First, basic or traditional research is necessary to generate new knowledge and technologies to deal with major unresolved health problems. Second, applied research is necessary to the process of identifying priority problems and to designing and evaluating policies and programs that will be of the greatest health benefit, using existing knowledge and available resources, both financial and human.

These two purposes together, in what has now been defined as essential national health research, must catalyze the generation of new knowledge and the application of existing knowledge, an essential link to equity in development.

During the past decade, concepts and research approaches to support health development have evolved rapidly. Many of these have been described by specific terms such as operations research, health services research, health manpower research, policy and economic analysis, applied research, and decision-linked research. Each of these has made crucial contributions to the development of Health Systems Research (HSR) but their limited and highly focused approaches to problem solving have resulted in their being integrated within the scope of HSR while at the same time describing their unique contribution to health in development.

HSR is ultimately concerned with improving the health of a community, however defined, by enhancing the efficiency and effectiveness of the health system as an integral part of the overall process of socioeconomic development.

The aim of HSR is to provide health managers at all levels with the relevant information that they need to solve the problems they are facing. The participatory nature of such research is one of its major characteristics. It is argued that the involvement of all parties - the community, health-care managers and decision-makers, and researchers - in the definition of the problem helps to focus the investigation and to enrich the quality of the data collected. Similarly, participating in all stages of the research is essential if feasible and acceptable solutions to problems are to be implemented and sustained at community, district, regional, or national level.

Because HSR addresses health problems in the broad context of social, economic, and community development, research inputs from many different disciplines are required. These include demography, epidemiology, health economics, policy and management sciences, social and behavioral sciences, statistics, and some aspects of the clinical sciences. Each of these disciplines has developed specialized research approaches in its efforts to provide information that will support health development, but it is increasingly evident that the problems that are addressed by HSR require a combined input from many disciplines and especially that researchers from these specialized fields need to acquire the skills to work together in multidisciplinary teams.

The main characteristics of HSR are

- Its focus on priority problems in health;
- Its participatory nature;
- its action orientation;
- Its integrated, multidisciplinary approach;
- Its multisectorial nature;
- Its emphasis on cost-effectiveness;
- Its focus on practical, timely solutions; and
- Its iterative nature that allows for evaluation of the impact of planned change and consequent revision of action plans and health policy.

Although its methodologies can be applied to similar problems in different countries, the findings and solutions to these problems are unlikely to be the same because of differences in cultural, social, economic, and political realities. This is one of the strong arguments in support of a national core of persons trained in HSR whose orientation and plan of work is guided by the country's agenda of essential national health research.

With progressive development, the uses of HSR are becoming more widely appreciated. As a result, it is being integrated into and applied in special areas of management such as quality assurance, technology assessment, and resource management.

Because the capacity for HSR is small, especially in developing countries, it is not surprising that, over the last few years, a series of training programs has been organized or funded by many agencies, including the International Development Research Centre (IDRC), the Pan American Health Organization (PAHO), the World Health Organization (WHO), and the US Agency for International Development (USAID).

As well, several international health programs have given high priority to capacity building for HSR.

- The UNICEF *Special Program on National Capacity Building for Child Survival and Development* aims "to strengthen awareness, knowledge, and skills for operations research using the health systems approach to promoting inquisitiveness and self-reliant approaches to identify pressing problems at the community level and find practical solutions for them."

- The overall goal of the *Network of Community Oriented Educational Institutions for Health Sciences* is "to improve the relevance of health professions education by enhancing the ability of graduates to help identify and solve the problems of communities in which they serve ... using as framework a new system of partnerships among universities, governments and communities, the focus of which is a program of essential national health research."

- The *International Health Policy Program* is planning to develop health-policy research and training centres, whose role will be to facilitate and coordinate the "synthesis of policy-relevant research, dissemination of such research, capacity building in health policy analysis, and technical assistance for policy analysis and research."

- The *International Clinical Epidemiology Network* (INCLEN) supports the development of clinical epidemiology units (CEUs) in medical schools in developing countries. The role of CEUs is to provide leadership in the application of quantitative measurement principles (drawn from clinical epidemiology, biostatistics, health economics, and health social science) in the research, education, and service responsibilities of the medical school.

- The Danish International Development Agency (DANIDA) has been supporting a series of inter-regional training workshops for research managers in HSR and, since 1987, the *Joint Project of the World Health Organization* and *The Netherlands Ministry for Development Cooperation - The Royal Tropical Institute* is involved in a process for capacity building for HSR in 14 countries of southern Africa.

All these and many more initiatives in capacity building for applied research received, in 1990, a strong political, moral, and intellectual backing in the recommendations of the Commission on Health Research for Development. In its *Agenda for Action*, the Commission recommends

> That building and sustaining research capacity be integrated as a key objective and powerful instrument for all health and development investments. Primary commitment must come from developing-country governments to accord priority and provide sustained financial support. Strong international re-enforcement is also needed. International exchange and interaction can do a great deal to help strengthen the capacity of developing-country researchers and institutions.

Within the broader context of the Commission's recommendations, three major challenges for the future development of HSR can be identified:

- How to enhance the demand for HSR;

- How to strengthen national capacities in HSR; and

- How to institutionalize the efforts into a sustainable process.

It is with these challenges in mind that this *Health Systems Research Training Series* was developed.

Annette Stark, Associate Director
Health Systems Research
Health Sciences Division
International Development Research Centre

Yvo Nuyens, Programme Manager
Health Systems Research and Development
World Health Organization

GENERAL INTRODUCTION

A recent review of Health Systems Research (HSR) workshops sponsored by IDRC concluded that, although IDRC's objectives had been met, training materials should be revised and expanded to meet the needs of specific groups and to guide the development of follow-up sessions. In a related action, the WHO Global Advisory Group on HSR concluded that building and sustaining national capacities for HSR was a major issue to be addressed in program activities. It was specifically recommended that these activities must include components to "evaluate and revise training materials periodically and to support training programs at different levels of the health systems."

As a result of these recommendations, representatives of IDRC, PAHO, and WHO met in Ottawa in October 1988 to review past and current initiatives and to propose future activities. The group recognized that, if training in HSR is to have an impact on improving health and health care, it is necessary to clarify the context and stages of development of an effective HSR process within a given country. It was further decided that specific target groups for orientation and training in HSR should be selected and appropriate training strategies developed to strengthen the research capacity of countries, based on their specific needs and capabilities in HSR.

To achieve this goal, a technical working group was established and given the mandate to define and coordinate the development of a basic set of training materials for each of five identified target groups. The framework consisted of:

- A definition of the target group;
- A description of the entry competence or entry characteristics of the target group;
- The expected outcome behaviour, including skills and attitudes;
- The appropriate training strategies and training context; and
- The available training materials.

The deliberations and effort of the Technical Working Group have resulted in these five volumes of materials. Users are encouraged to become familiar, generally, with the entire set and then to selectively implement a program of training, research, planning, and health-care policy based on their country's needs.

Volume 1: Promoting Health Systems Research as a Management Tool

For Decision-makers
This document focuses on the need to promote the use of HSR as a management tool among decision-makers. Based on an analysis of experience in developing countries in the last decade, it presents an overview of how HSR can lead to better decisions and how the development of an effective research program can be fostered at country level. In addition, it provides descriptions of specific strategies for promoting HSR among policymakers and senior managers that have been used successfully in a number of settings.

Volume 2: Designing and Conducting Health Systems Research Projects

Part I - Proposal Development and Fieldwork
Part II - Data Analysis and Report Writing

Course participants, who may include concerned citizens, health workers, researchers, and health decision-makers from the provincial or even national level, will select priority health problems particular to their own situations that cannot be solved unless more information is collected. Preferably, the topics will have been selected before the training starts (see Volume 1), but they may need more specification. In most cases, a team of course participants will then carry out the planned research alongside their regular duties (Part I). A second workshop is then scheduled to provide information on data analysis, report writing, and utilization of results (Part II).

This volume is the pivotal one that deals specifically with the development of research proposals of a participatory nature (community/health-care manager/researcher) and, subsequently, with the implementation of the field study and the analysis and dissemination of study results. In this context, it is also of interest to junior researchers and those persons in universities and other training facilities who wish to operationalize HSR.

Volume 3: Strategies for Involving Universities and Research Institutes in Health Systems Research

For Senior Researchers and Academic Staff

This volume is designed to assist university-trained researchers located in universities or research institutes who wish to promote and participate in multidisciplinary programs of HSR. This volume will be of particular interest to those who wish to integrate the concepts of HSR into existing health and social science degree programs and to promote the development of student theses in the area.

Volume 4: Managing Health Systems Research

For Research Managers

The research managers for whom this volume is intended include managers of research institutes, academic departments, and agencies that have a function in processing research applications and in funding and coordinating research projects. The training should enable managers to facilitate their institutions' or organizations' contribution to and support of the development of HSR in the country as well as the utilization of research in improving the health of the people.

Volume 5: Training of Trainers for Health Systems Research

For Trainers and Facilitators

Experienced researchers are not necessarily experienced teachers. Moreover, few of them have experience in the organization and training of participants for whom research is a secondary responsibility and who have limited time to read or engage in research activities.

For training in HSR to be effective, experienced researchers need to acquire competence in the training approaches that have been successfully developed and used during the past few decades for training health personnel in a variety of important topics related to health.

Trainers and facilitators include those whose primary responsibility is organizing and conducting training courses for the different target groups and those who assist trainers in conducting courses.

INTRODUCTION TO THIS VOLUME

Since module 1 of this volume provides a thorough introduction to the course and how it is organized, here we will only provide a brief overview of where the reader can find various types of information and how the course can be used.

Part I, *Proposal Development and Field Work*, contains modules 1-20, of which the first 18 will lead the course participants through all steps that the development of their proposal requires. Modules 19 and 20 guide them through the fieldwork period and preliminary data analysis.

Each module contains detailed instructions for group work on the successive steps in the development of the proposal. At the end of each module, facilitators will find Trainers Notes, providing guidelines on how to present the modules and how to assist the groups in the writing of their research proposal.

After module 20 an annex has been included containing general guidelines for the planning and management of workshops, the training methodology and the supervision of field work. A proposal for budget items has been added, as well as two examples of course schedules, one as used in the workshops in the southern Africa region and the other as used in the workshops in Malaysia. These schedules are alterative programmes for workshops given full-time, over a two to two-and-a-half week period. The training materials can be used in other ways as well, such as in courses in university settings, with the modules being taught over a period of a quarter or semester.

This example of the variety of schedules that can be followed illustrates the most important guideline for the application of these modules: BEING FLEXIBLE. The only general rule is that participants and facilitators should be conscious of the cyclical nature of the process of developing a research proposal. In many group work sessions, participants will therefore be referred back to earlier parts of the proposal they developed to make adjustments, if required. In module 20 they are advised to review once again all sections of their proposal when writing the summary.

The managers of a course can adapt the time devoted to presentations and group work, as well as the sequence of modules, to the needs of their target groups. It is, for example, quite possible to combine modules 4 and 5 (Statement of the Problem and Literature Review) if a problem is relatively well defined. Also modules 8, 9 and 10 (Variables, Study Type and Data Collection Tools) are closely connected, and the group work for modules 9 and 10 has already been combined.

For participant groups that include many health managers who already have extensive administrative experience it may be feasible to present modules 15 (Work Plan), 16 (Plan for Project Administration, Monitoring and Utilization of Results) and 17 (Budget) as one block, entitled "Management of a Research Project."[1] Modules 10C and 10D (Focus Group Discussion and Other Data Collection Techniques) are optional, depending on the type of study chosen.

Part II of this volume, *Data Analysis and Report Writing* containing modules 21-32, has been published separately because the document would have been too bulky if both parts had been published together. The same principles apply for Part II as outlined for Part I. We have included some specific guidelines in the introduction to Part II, where they are more relevant.

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[1] Module 12 (Plan for Data Collection) can also be shortened and included in this combined section, if most participants have had extensive experience in organizing field activities.

It is advisable to distribute Part II during the first workshop. Participants who use qualitative research techniques, such as focus group discussions, would need to read module 24 (Analysis of Qualitative Data), when developing their plan for data analysis (module 13). For those using quantitative techniques, modules 22 and 23 (Description of Variables I and Cross-tabulation of Data) may be required when variables are introduced (module 8) or when data analysis is discussed (module 13).

To conclude, we would like to point out that in the course of the development of the modules, they have been successfully used in the orientation and training of all the target groups. As indicated above, the series of modules is flexible enough to allow adaptation for specific purposes, such as proposal review. In this way the group work element which is extremely instructive is maintained, but participants can develop research proposals individually, at their own pace.

Corlien M. Varkevisser
Indra Pathmanathan
Ann Brownlee

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 1:

COURSE ORIENTATION

Module 1: COURSE ORIENTATION

COURSE OBJECTIVES

At the end of this course, you should be able to:

1. **Describe** what HSR is and understand the contribution it can make toward solving priority problems in health care within the local context.
2. **Prepare** a health systems research proposal by completing the following steps:
    - Problem identification;
    - Review of literature and other available information;
    - Formulation of research objectives;
    - Development of an appropriate research methodology;
    - Development of a strategy for distribution and utilization of results;
    - Preparation of a work plan; and
    - Identification of resources required and preparation of a budget.
3. **Implement** this proposal in your own working situation during a period of 4-6 months.
4. **Analyze** and interpret the results.
5. **Prepare and present** a final report including recommendations for implementation of the research findings.

Who is the health systems research course aimed at?

The health systems research (HSR) course has been developed for mid-level managers, health workers, and junior researchers working in health and health-related services.

What training method is used in the HSR course?

The training method applied is based on **learning by doing**. Course participants will themselves develop research proposals which they will actually carry out in the field.

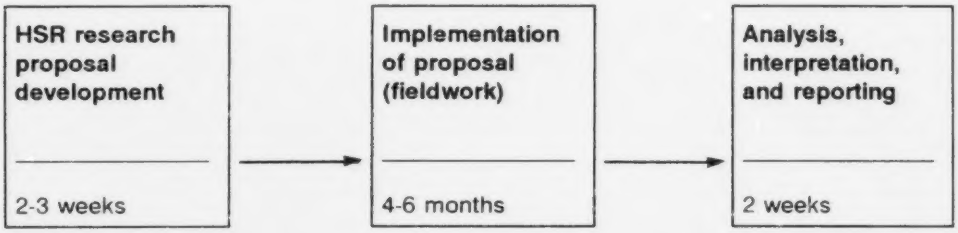
Each participant and trainer brings to this course his or her own experiences in applied research and in the management of health or health-related projects. Thus, the course should not be perceived as having a teacher-student orientation. It should rather provide a forum for sharing information where everyone can contribute the benefits of his or her own experience and knowledge. This sharing will add greatly to the richness and relevance of the course.

What type of projects will be developed?

Together with community leaders and health decision-makers from the provincial or even national level, course participants will select priority problems in their own work situations that cannot be solved unless more information is collected. Preferably, the topics will have been selected before the training starts, although they may need more specification. In most cases, a **team of course participants** will carry out the planned research alongside their regular duties. If the team members have other duties, the project will have to be of modest size. For example, a maximum of 30 days for field work and preliminary analysis per group member, and a maximum of US $5000 per research project would be advisable.

How long is the course?

The course will take about 7 months to complete and will include three main components:


HSR research proposal development
2-3 weeks
Implementation of proposal (fieldwork)
4-6 months
Analysis, interpretation, and reporting
2 weeks

Component 1. HSR proposal development

The first 2-3 week workshop will provide an introduction to HSR. Participants will work in small groups and step by step design research proposals on the priority problems they have selected. As each new step is introduced, new concepts and research procedures will be presented. The participants will immediately apply these in the proposals they are developing. Modules 1-18 deal with proposal development.

Component 2. Implementation of the proposal

During the following 4-6 months, the same groups of participants will implement their proposals. It is, therefore, important that the groups are composed in such a way that they can easily cooperate during the fieldwork. Modules 19 and 20 give guidelines for the fieldwork and for writing a preliminary report during the fieldwork period.

Component 3. Analysis of the data and reporting

After project implementation, participants will meet again for a further 2-week workshop to review the results of their research. During this workshop, the data will be analyzed and interpreted and a final report with recommendations for action will be prepared and presented. Because many of the participants are in direct positions of managerial responsibility, and because higher-level decision-makers have been involved, it is expected that recommendations can be implemented soon after the studies are completed. Modules 21-32 pertain to data analysis, report writing, and drafting and implementing the recommendations.

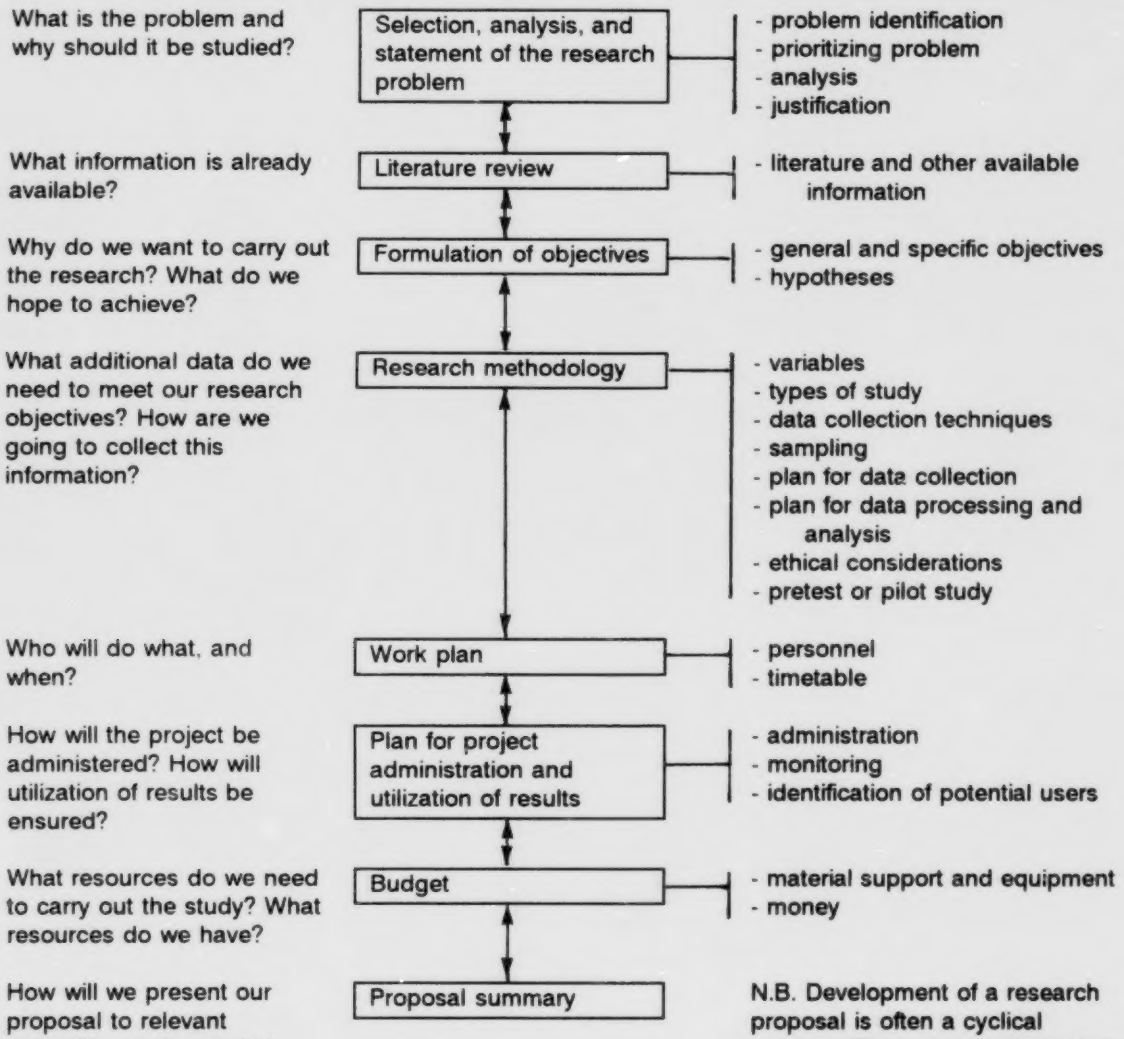
How will the research proposal be developed?

A number of basic steps have to be taken when developing a research proposal. These steps are presented in the diagram on the following page.

This diagram appears on the back of each of the pages that mark the beginning of modules 3-18. Each time the diagram appears, the step in the proposal-development process that the module addresses is indicated by a thick box.

It should be stressed, however, that designing a research proposal is not a linear but a **cyclical** process. Throughout the course, there will, therefore, be opportunities to review and, when the need arises, revise parts of the proposal that have already been drafted. When developing the research methodology, for example, the teams may find that the objectives and even the statement of the problem need to be revised to be made more specific. When finalizing the work plan and budget, the teams may determine that the research design, for financial reasons, may need to be revised so the project is more modest and thus less costly.

Steps in the development of an HSR proposal



Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	

N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

By the end of the first part of the course, each group will have developed a research proposal with the following chapters. (For details, see module 18.)

1. INTRODUCTION
    - 1.1 Background information
    - 1.2 Statement of the problem
    - 1.3 Literature review

2. OBJECTIVES

3. METHODOLOGY
    - 3.1 Study type, variables, and data collection techniques
    - 3.2 Sampling
    - 3.3 Plan for data collection
    - 3.4 Plan for data processing and analysis
    - 3.5 Ethical considerations
    - 3.6 Pretest

4. WORK PLAN (including description of project staff)

5. BUDGET (including explanatory note on major budget items)

6. PLAN FOR ADMINISTRATION, MONITORING, AND UTILIZATION OF RESULTS

Annex 1. References

Annex 2. List of abbreviations (if applicable)

Annex 3. Data-collection instruments (including questionnaires)

In the second workshop for data analysis and report writing, a similar approach will be followed.

How may this set of modules be used?

The course has been organized in such a way that each module can be dealt with independently. A module implies:

- A **presentation** of the necessary theory and concepts to enable the participants to carry out this specific step in proposal development or data analysis and report writing. Presentations last between 30 minutes and 1 hour and include opportunity for questions and discussion.

- **Groupwork** during which groups, with assistance of their facilitator, use these concepts in the development of their proposal or in data analysis and report writing. The modules for proposal development, in particular, contain detailed instructions for groupwork. Groupwork may last from 1-4 hours per module, and sometimes longer.

- **Reporting** of the results of the groupwork in **plenary** by a member of each group, so that other groups and facilitators can comment. Plenaries are of crucial importance during the first workshop. During the data-analysis workshop, they are less frequent as not all modules are relevant for all groups. On the average, each group has 15 minutes for presentation and discussion, but for important topics this may be 30 minutes.

- Sometimes a module contains an **exercise**, either using examples provided during the presentation or using the groupwork results of other groups.

Depending on the level of the groups, it may be possible to combine certain modules and to shorten or lengthen the time allocated for presentations and groupwork.

Note

Participants are advised to read the course materials beforehand so that they can benefit, as much as possible, from presentations and groupwork. It may be extremely useful, however, for the participants to (re)read the course material after the presentation and groupwork, especially if they have had no previous research training or experience.

Trainer's Notes

Module 1: COURSE ORIENTATION

Timing and training methods

1-1½ hours	Introductions (if not completed the night before)
¾ hour	Description of the course
¼ hour	Administrative remarks
1-2½ hours	TOTAL TIME

Materials

- Name tags for participants and trainers;
- Flip charts and markers;
- Course training materials for participants; and
- Overhead sheets for presentation.

Introduction of participants and facilitators

If you were unable to do the mutual introduction of participants on the evening before the course begins, have all the participants (including the facilitators) introduce themselves. Make certain everyone indicates his or her experience, major activities, and research interests. This may be done by having participants interview each other in pairs and then each introduce the person they interviewed. Names and a summary of the interview could be put on a flip chart and stuck to the wall.

The introduction may take 1-1½ hours.

If you were not able to give the pretest the evening or afternoon before the course begins, allow 1¼ additional hours for the pretest at this point.

Description of the course

- Present the major objectives of the course and stress its practical orientation. It should be clear to all participants that they will each work as part of a small group to develop a research proposal that they themselves will carry out. It should also be stressed that one important goal of the course is that the research findings be used to help solve the problem the group has investigated. Therefore, decision-makers and users should be involved in the choice of the topic, the review of the proposal, and the discussion of research findings and recommendations. Depending on the location of the course and the participants, each team should consider holding information sessions for interested persons on their return home. (This will be discussed again later in the course.)

- Emphasize the uniqueness of each participant's background and experience, pointing out how important it will be for everyone to contribute to the development of the proposal and to learn from each other.

- Distribute the course training document to the participants. Describe how the course will be structured and how the training document will be used. Show the colored pages with the title of the module on the front and the diagram on the back, which appear at the beginning of each module. Explain that each session contains a presentation and groupwork during which each group will apply the concepts presented in the development of its proposal. Indicate that directions for groupwork are presented in boxes with double lines around them. Mention that some sessions also have exercises, which are presented in boxes with single lines around them. Discuss the fact that, in some modules annexes, provide more details on research methodology for those who are interested.

- Stress that the end product of the first workshop will be a research proposal that will be written, step by step, by the participants according to the plan presented on page 6 (Module 1).

Administrative issues

- Present any other information concerning the course and administrative arrangements that may be necessary and ask for final questions.

Health Systems Research Training Series
Volume 2: Part I: Proposal Development and Fieldwork

Module 2:

INTRODUCTION TO HEALTH SYSTEMS RESEARCH

Steps in the development of an HSR proposal

Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	

N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 2: INTRODUCTION TO HEALTH SYSTEMS RESEARCH

OBJECTIVES

At the end of this session, you should be able to:

1. **Describe** the major characteristics of research.
2. **Describe** various components of the health system as a basis for understanding HSR.
3. **Describe** types of information needed for decision-making in the health system and the contribution various disciplines can make in providing such information.
4. **Describe** the purpose, scope, and characteristics of HSR.

Health for all

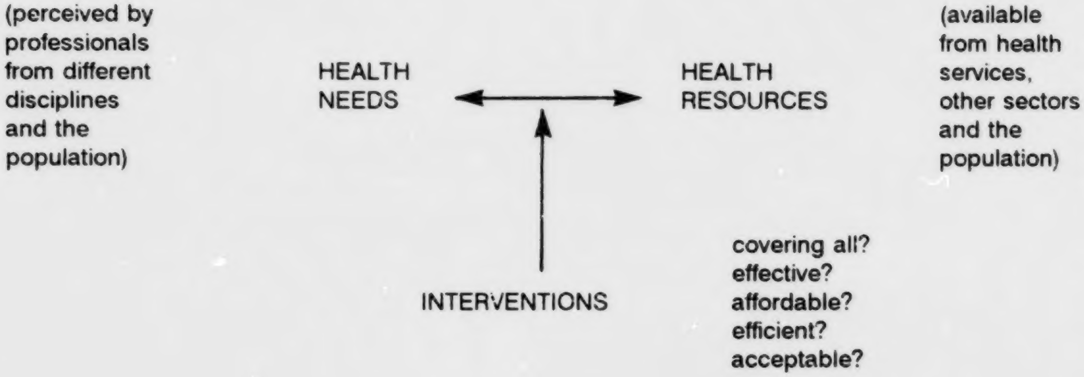
The adoption of the philosophy and strategies for **Health For All by the Year 2000** implies that we are committed to ensuring that *all* people (not just some) will attain a level of health that enables them to participate actively in the social and economic life of the community in which they live.

In the past, research has made major contributions to health by providing knowledge on the causes of diseases and ill health and by developing the technology to cure and prevent disease and promote health.

However, despite the considerable amount of knowledge and technology that is available today, many peoples continue to be unable to achieve the targets of Health For All. Why is this so?

The health of any community depends on the interaction and balance between the health needs of the community, the health resources that are available, and the selection and application of health and health related interventions. This can be illustrated as in Fig. 2.1. It is evident that it is important to apply the available technology in an optimal manner, within the limited resources available, in order to serve the health needs of the community.

Figure 2.1. Evaluating health interventions.


(perceived by
professionals
from different
disciplines
and the
population)
HEALTH
NEEDS
HEALTH
RESOURCES
(available
from health
services,
other sectors
and the
population)
INTERVENTIONS
covering all?
effective?
affordable?
efficient?
acceptable?

To effect the necessary changes to achieve Health for All, countries must decide on the best approaches to adopt. This requires detailed and accurate information on needs, possibilities, and consequences of recommended actions. Such information is often lacking, inadequate or unreliable. For this reason, decision-making based on assumptions and unjustified conclusions often result in the selection of inappropriate policy and program choices, the consequences of which are only discovered after implementation.

In many instances, **research** can provide the information needed for informed decision-making.

What is research?

RESEARCH is the systematic collection, analysis, and interpretation of data to answer a certain question or solve a problem.

Characteristics of research:

- It demands a clear statement of the problem;
- It requires a plan (it is not aimlessly "looking" for something in the hopes that you will "come across a solution");
- It builds on existing data, using both positive and negative findings; and
- New data should be collected as required and be organized in such a way that they answer the original research question(s).

Research serves two major purposes in acceleration of advances in health.

First, **basic research** is necessary to generate new knowledge and technologies to deal with major unresolved health problems. Second, **applied research** is necessary to identify priority problems and to design and evaluate policies and programs that will deliver the greatest health benefit, making optimal use of available resources.

During the past two (or even three) decades, there has been a rapid evolution of concepts and research approaches to support managerial aspects of health development. Many of these have been described by specific terms such as operations research, health services research, health manpower research, policy and economic analysis, applied research, and decision-linked research. Each of these has made crucial contributions to the development of HSR (WHO 1990).

The focus of HSR

HSR is ultimately concerned with improving the health of a community, by enhancing the efficiency and effectiveness of the **health system** as an integral part of the overall process of socioeconomic development.

What is meant by a "health system"?

A HEALTH SYSTEM may be described as:[1]

- A **set of cultural beliefs** about health and illness that forms the basis for health-seeking and health-promoting behaviour;
- The **institutional arrangements** within which that behaviour occurs; and
- The **socioeconomic/political/physical context** for those beliefs and institutions.

In short, it consists of what people **believe and know** about health and illness and what they **do** to remain healthy and cure diseases. Beliefs and action are usually closely connected. For example, if in a society people perceive evil ancestor-spirits as a cause of disease, there will be specialists and rituals to appease those spirits. If they see germs as the cause, they will look for modern (biomedical) health care.

If biomedical health care is a recent introduction, people may accept services, but the beliefs and knowledge to support this behaviour may not have been fully developed. Health workers therefore should be aware of the indigenous explanations for illness, so that "biomedical" explanations can be adapted to these more deeply rooted indigenous concepts.

Institutional arrangements within which health behaviour occurs encompass more than the delivery of medical care through governmental health services. They includes ali individuals, groups, and institutions that directly or indirectly contribute to health. These may differ from society to society, but usually cover the following components:

1. **The individual, family, and community**

   The individual, family, and community assume a vital responsibility for health promotion as well as for the curative care of its members. In any society as much as 70-90% of all curative activities may take place within this network. Several studies, carried out in Western and non-Western societies, support this statement (Kleinman 1978).

---

[1] Adapted from Foster et al. (1978); see also Scrimshaw and Hurtado (1984).

2. Health care services

There are health care services in the public (government) sector as well as the private sector.

Public sector health care services

These include:

- Health workers at village level, mobile health teams, rural health clinics, and their outreach services (e.g., midwifery, sanitation, nutrition, malaria control, etc.);
- Health centres, urban clinics, district hospitals, and large multispecialty hospitals with their various support services such as laboratory, radiology, pharmaceuticals, etc.; and
- Institutions responsible for health personnel, health financing, and physical infrastructure.

The number, type, distribution, and quality of services provided by these services influence health and well being.

Private sector health-care services

This sector may include:

- Folk (or traditional) medicine with traditional birth attendants, herbalists, and diviners, who may identify natural or supernatural causes of diseases and treat them accordingly;
- The large non-Western professionalized healing systems (Ayurvedic, Chinese, Yunani, homeopathic, chiropractic, etc). In some societies these belong to the public sector;
- Private "modern" medical practice, legal or illegal;
- The pharmaceutical sector (private or parastatal); and
- Nongovernmental health care (churches, Red Cross, etc.).

The relative importance of these components varies in different societies.

3. Health-related sectors

These include, for example:

- Agriculture and food distribution;
- Education (formal and nonformal);
- Water and sanitation; and
- Transport and communication.

All these sectors contribute to health, either directly or indirectly.

At village, ward, district, provincial, and national level, development committees, or councils may exist which could promote intersectoral cooperation for development and health.

4. **The international sector**, including bilateral and multilateral donor agencies (UNICEF, WHO, etc.) that may support health as well as development activities.

The individual and his close relatives form the major integrating force of the health system. They choose and combine the activities that they believe will promote their health and well-being. They may decide to use certain institutions and reject others. Health services may not always be their first choice.

In many countries, efforts are being made to increase coordination between the various public services, and between governmental services, NGOs, and other healing systems to promote health.

How well the different components of the health system function depends to a large extent on **socioeconomic, political, cultural, physical, epidemiological, and other contextual factors**. For example, economic crises or booms will affect the health and nutritional status of individuals as well as the national budget available for health services.

Figure 2.2 on the following page illustrates various possible components of the health system.

Selectivity versus comprehensiveness in HSR

Because HSR is **problem-oriented**, it should be **selective** and concentrate on those factors that will help to explain and solve the problem being examined. It is very seldom that all components of the health system will be involved in one study, although HSR studies rarely limit themselves to one component only.

Even within the narrower field of the health services, HSR focuses on specific topics, depending on who experiences the problem and at what management level.

Health policymakers may, for example, want to know:

- How can special programs be prevented from draining away resources (time and staff) from other equally necessary services?
- Should specially prepared packets of electrolytes be purchased for oral rehydration of children with diarrhea or should people be taught how to prepare sugar-salt solutions themselves?

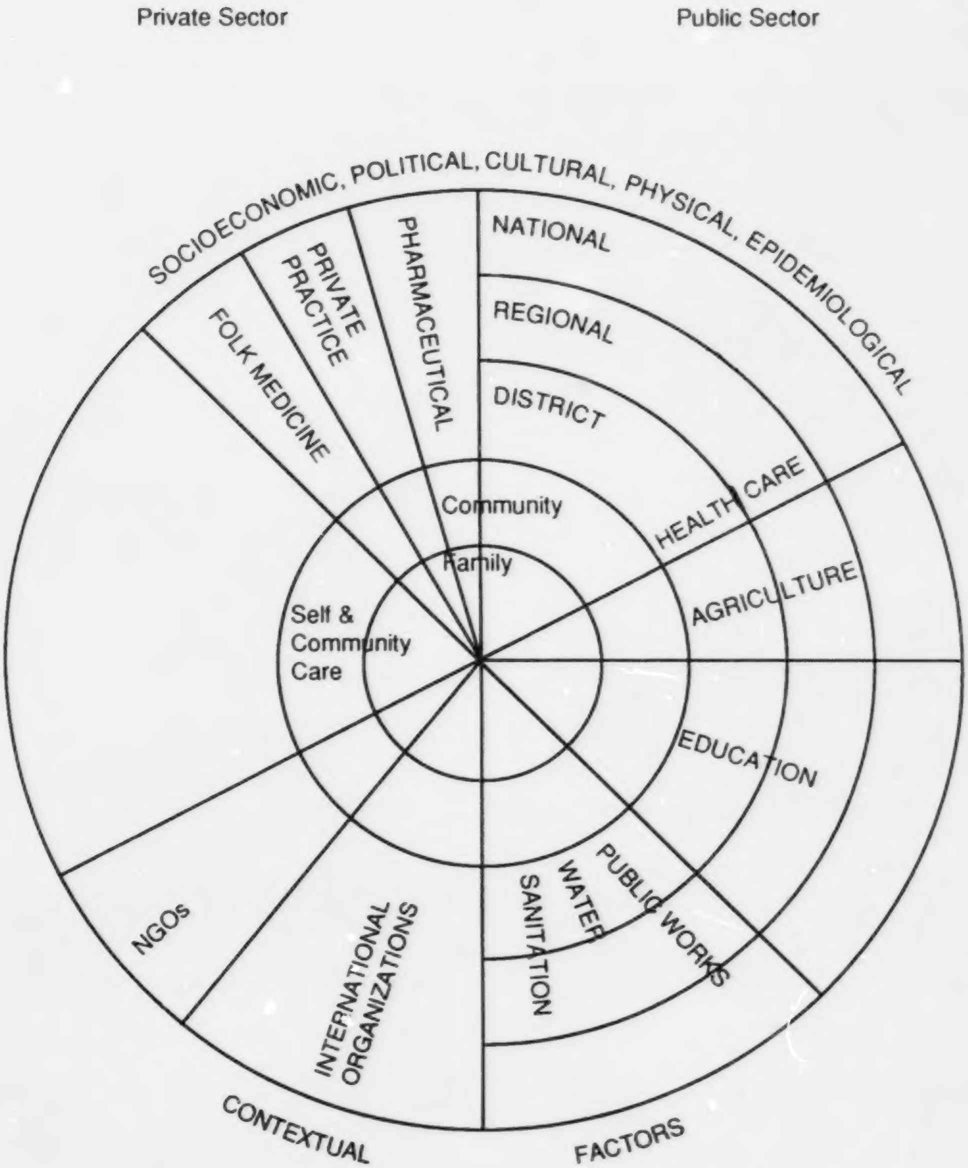
Managers at district/provincial level may raise questions such as:

- Why is neonatal mortality in certain districts much higher than in other districts?

Hospital directors may ask:

- Why do we observe such a high rate of complications in leprosy cases? Are the first-line services sufficiently available and adequate? Are our own services adequate? Are patients coming late for treatment and, if so, why?

Figure 2.2. The health system.


Private Sector
Public Sector
SOCIOECONOMIC, POLITICAL, CULTURAL, PHYSICAL, EPIDEMIOLOGICAL
CONTEXTUAL
FACTORS
PRIVATE PRACTICE
PHARMACEUTICAL
FOLK MEDICINE
NATIONAL
REGIONAL
DISTRICT
HEALTH CARE
AGRICULTURE
EDUCATION
PUBLIC WORKS
WATER
SANITATION
INTERNATIONAL ORGANIZATIONS
NGOs
Community
Family
Self & Community Care

- Are the routine procedures and policies (clinical, nursing, referral, recording, etc.) in the different units appropriate? Comprehensive? Acceptable to patients? Efficient?

Managers at village level (village health committees and village health workers) may want to know:

- Why are our village health posts underutilized?
- How can we assist illiterate women so that they can effectively prevent and treat diarrhea?

Community leaders may want to know:

- What will be the effects of a cost-recovery program on drug costs and availability of drugs?
- How much community labour will be required to manage the new water system?

(Please add your own examples.)

The **aim of HSR** is to provide health managers at all levels, as well as community leaders, with the relevant information they need to make decisions on problems they are facing.

We must be aware that problems at one level of the health system are usually connected with problems or deficiencies at other levels. HSR should address problems from the different perspectives of all those who are, directly or indirectly, involved. Otherwise, we run the risk of coming up with results that only partly explain the problem and that are, therefore, insufficient to solve it.

Figure 2.3 highlights some major areas of concern within the health system.

Health systems research is multidisciplinary

It is evident that many of issues in one area of concern are interrelated and interact with issues in other areas. Research in health systems must recognize this. The research skills that are needed might need to come from a variety of disciplines, e.g., medical, epidemiology, behavioural science, economics, etc. Therefore, HSR is multidisciplinary in nature.

Figure 2.4 illustrates the types of disciplines that may be needed in HSR focused on these various areas of concern within the health system.

Even the simple research that is done at the operational level may require research skills from different disciplines (e.g., epidemiology, sociology, and management) to provide sufficient and relevant information to support decision-making. Therefore, training in HSR includes relevant aspects from various research disciplines.

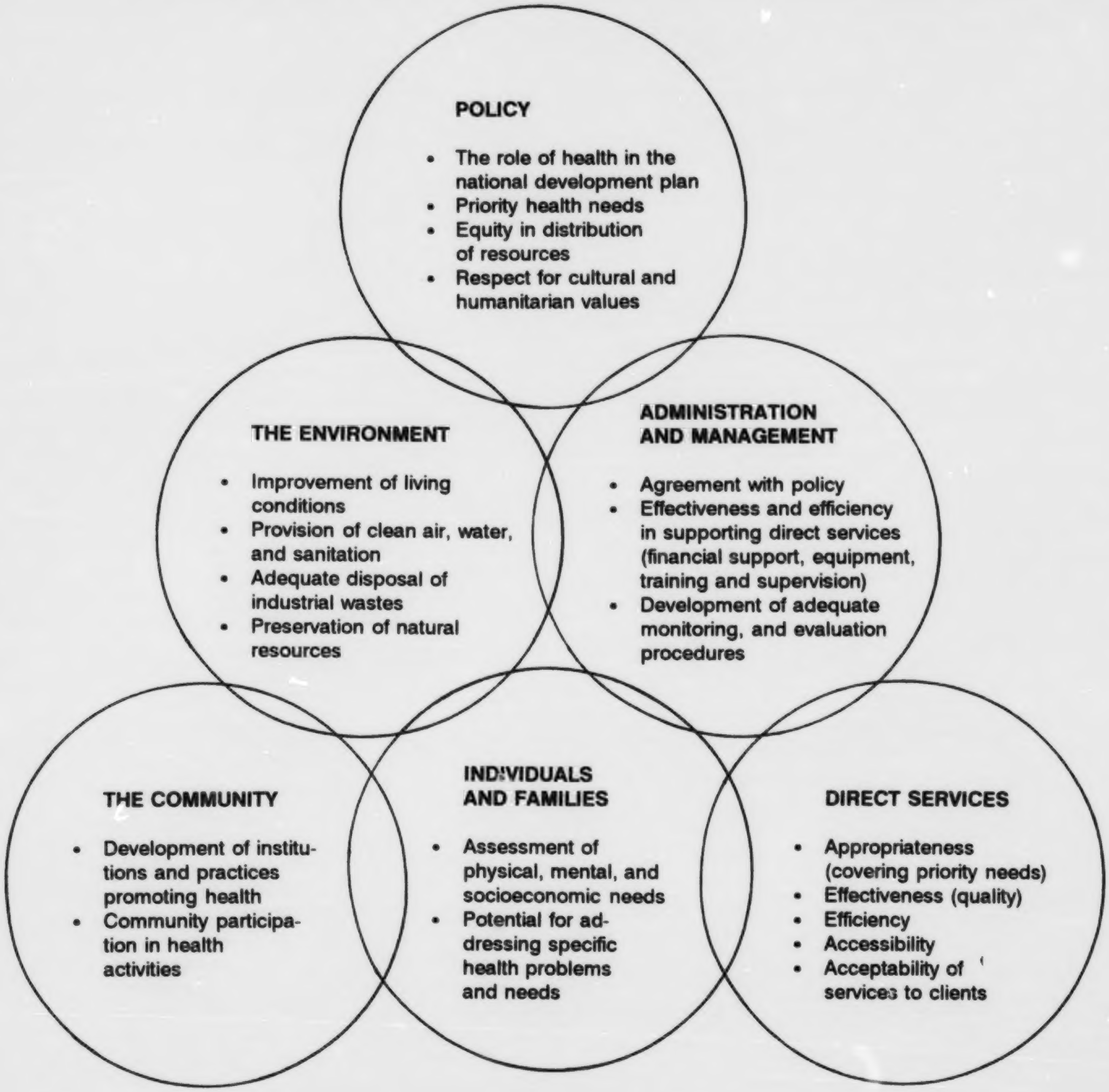


Figure 2.3. Areas of major concern within the health system (adapted from Purola 1986).

POLICY

- The role of health in the national development plan
- Priority health needs
- Equity in distribution of resources
- Respect for cultural and humanitarian values

THE ENVIRONMENT

- Improvement of living conditions
- Provision of clean air, water, and sanitation
- Adequate disposal of industrial wastes
- Preservation of natural resources

ADMINISTRATION AND MANAGEMENT

- Agreement with policy
- Effectiveness and efficiency in supporting direct services (financial support, equipment, training and supervision)
- Development of adequate monitoring, and evaluation procedures

THE COMMUNITY

- Development of institutions and practices promoting health
- Community participation in health activities

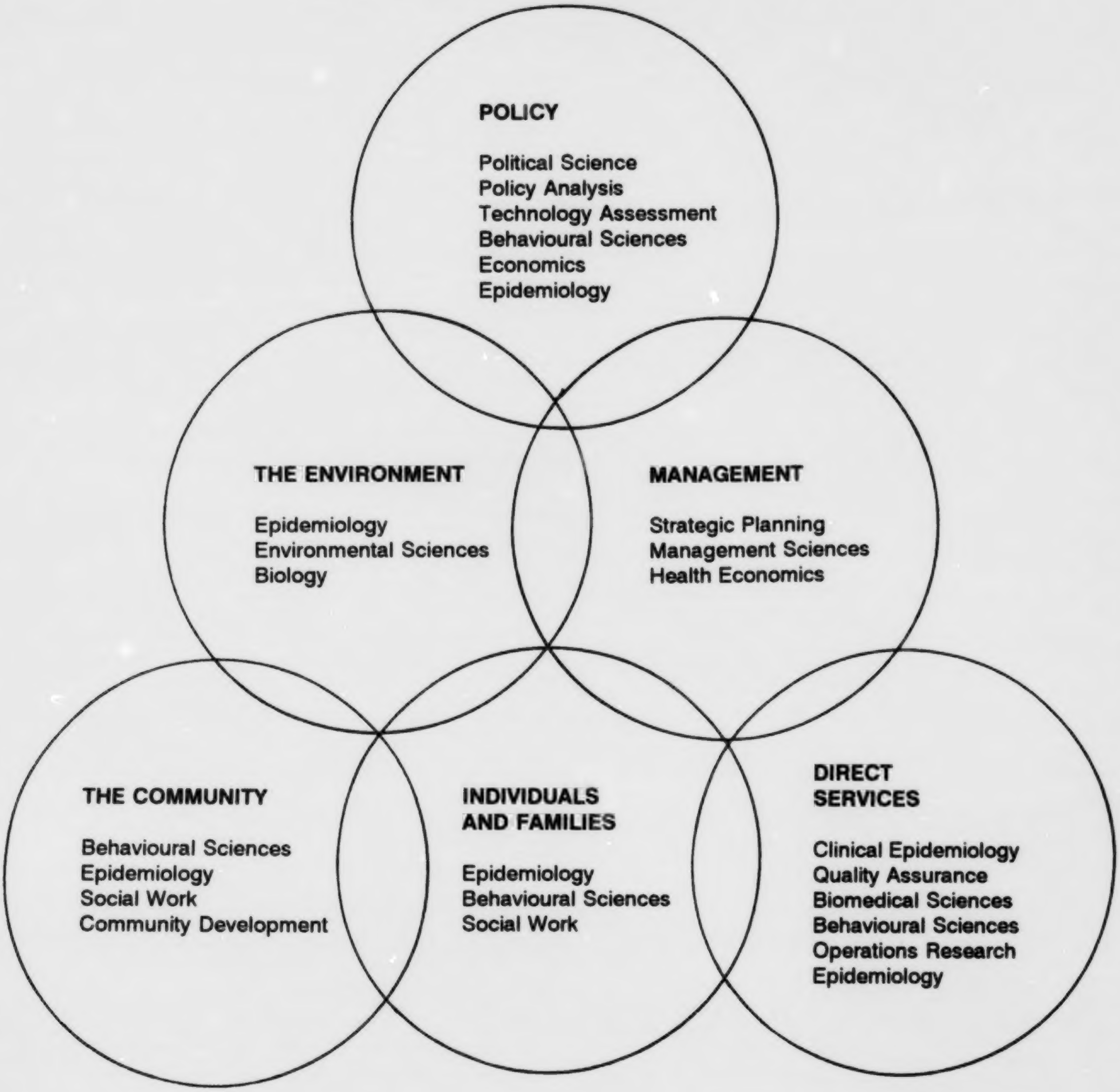
INDIVIDUALS AND FAMILIES

- Assessment of physical, mental, and socioeconomic needs
- Potential for addressing specific health problems and needs

DIRECT SERVICES

- Appropriateness (covering priority needs)
- Effectiveness (quality)
- Efficiency
- Accessibility
- Acceptability of services to clients

Figure 2.4. Multidisciplinary skills needed in HSR.


POLICY
Political Science
Policy Analysis
Technology Assessment
Behavioural Sciences
Economics
Epidemiology
THE ENVIRONMENT
Epidemiology
Environmental Sciences
Biology
MANAGEMENT
Strategic Planning
Management Sciences
Health Economics
THE COMMUNITY
Behavioural Sciences
Epidemiology
Social Work
Community Development
INDIVIDUALS AND FAMILIES
Epidemiology
Behavioural Sciences
Social Work
DIRECT SERVICES
Clinical Epidemiology
Quality Assurance
Biomedical Sciences
Behavioural Sciences
Operations Research
Epidemiology

Researchers who will work in multidisciplinary teams will need to acquire a basic understanding of the concepts and approaches as well as the potential and limitations of research techniques used in sister disciplines.

HSR, however, is not the concern of scientists alone.

Who should be involved in HSR?

The participatory nature of HSR is one of its major characteristics. To ensure that the research is relevant and appropriate, everyone directly concerned with a particular health or health-care problem should be involved in the research project(s) focused on it. This could include policymakers, health managers from the health services involved, health-care providers, and the community itself. This involvement is critical if the research activities are to make a difference:

- If decision-makers are involved only after completion of the study, the report may just be shelved.
- If health staff are involved only in data collection and not in the development of the proposal or in data analysis, they may not be motivated to collect accurate data or carry out the recommendations.
- If the community is only requested to respond to a questionnaire, the recommendations from the study may not be acceptable.
- If professional researchers are not involved in the implementation of recommendations, they may have little concern for the feasibility of the recommendations.

The roles that various types of personnel will play in the research project will depend on the level and complexity of the particular study, as well as its area of focus. Some projects are very complex and may need expertise from several disciplines. Others may focus on simpler problems.

Although complex research projects at the policy level may require heavy involvement of a multidisciplinary team of researchers, health-care decision-makers, health providers, and representatives from the community that will be affected by the policy should be involved as well. Although service personnel may take the major role in simpler studies focusing on practical problems in their own working situations, their projects may require assistance from researchers with skills in relevant disciplines, as well as the participation of health managers and the community.

Note:
Because of the participatory nature of HSR, in the modules that follow we will use the term RESEARCHER to mean anyone actively involved in planning and conducting the research.

Guidelines for health systems research

Bearing in mind that HSR is undertaken primarily to provide information to support decision-making that can improve the functioning of the health system, we summarize some essential guidelines for success:

1. HSR should focus on **priority problems** in health care.

2. It should be **action-oriented,** i.e., aimed at developing solutions.

3. An integrated **multidisciplinary** approach is required, i.e., research approaches from many disciplines are needed because health is affected by the broader context of socioeconomic development.

4. The research should be **participatory** in nature, involving all parties concerned (from policymakers to community members) in all stages of the project.

5. Studies should be scheduled in such a way that results will be available when needed for key decisions. Otherwise, the research loses its purpose, i.e., research must be **timely.**

6. Emphasis should be placed on comparatively **simple, short-term research designs** that are likely to yield practical results relatively quickly. Simple but effective research designs are difficult to develop, but much more likely to yield useful results when needed.

7. The principle of **cost-effectiveness** is important in the selection of research projects. Program management and operational research should focus, to a large extent, on low-cost studies that can be undertaken by management and service personnel in the course of daily activities. (There is a need for some larger studies as well, however, that may require outside funding.)

8. Results should be presented in **formats most useful for administrators, decision-makers, and the community**. Each report should include:

   - A clear presentation of results with a summary of the major findings adapted to the interests of the party being targeted by the report.

   - Honest discussion of practical or methodological problems that could have affected the findings.

   - Alternative courses of action that could follow from the results and the advantages and drawbacks of each.

9. **Evaluation** of the research undertaken should not be a measure of the number of papers published but of its ability to influence policy, improve services, and ultimately lead to better health.

Thus, an HSR project should not stop at finding answers to the questions posed, but include an assessment of what decisions have been made based on the results of the study.

Module 2: INTRODUCTION TO HEALTH SYSTEMS RESEARCH

Timing and training methods

1 hour	Introduction and discussion

Adapting the presentation to the participants

It is recommended that the content and focus of the module be adapted to the level and interests of the participants. For example:

1. Review the background of participants (e.g., primary health care, clinical medicine, research, policymaking, or community leadership).

2. Based on this review, select suitable examples related to the background of participants to illustrate each concept.

   Remember that understanding of abstract concepts is facilitated if participants can relate them to their own experience.

3. The focus and scope of this module can be varied in accordance with the expected future roles of participants in the research teams.

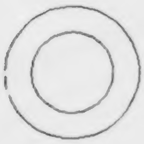
   For example, if participants are fairly specialized personnel from a single discipline or from just a couple of disciplines, it would be useful to focus on the multidisciplinary aspect of HSR and the types of information that disciplines other than those represented in the workshop can provide.

   (For example, if workshop participants are hospital managers and clinicians, illustrate the uses of research input from behavioural science for HSR; if participants are behavioural scientists such as health education officers and sociologists, illustrate the importance of input from management sciences, health economics, and clinical epidemiology).

If participants are health personnel or community leaders from the district level, illustrate your presentation with examples of the types of research information that is useful at the front line operational level or at the district level, as well as the types of information needed at program management and policy levels. Give examples of the various disciplines and research that provide such information (e.g., needs assessment, operational research, cost-benefit analysis, policy analysis, etc.) This will enable participants to recognize the spectrum of research that is covered by the term "HSR" and identify their own place within it.

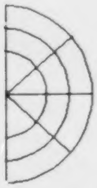
4. When presenting figures, use different overhead sheets for the different components. For example, the health system (Figure 2.2) could be presented by placing four sheets on top of each of other, one by one.

1.



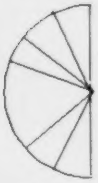
Individual family and community

2.



The public sector

3.



The private sector

4.

Contextual factors

The diagram that highlights some major areas of concern at different levels of the health system (Figure 2.3) could consist of six overlapping overhead sheets.

5. Ask participants to give examples of topics suitable for HSR from their own working environment.

6. Ask whether they have participated in evaluations or other regular research activities. Demystify the concept of HSR. Identify in what stages of the research they have participated and whether the participation was optimal.

7. Try to draw the points mentioned in the guidelines from the participants themselves. By the end of the introductory session, they should be able to come up with some points on their own.

Preworkshop reading

The following document could be sent to participants before the workshop:

World Health Organization 1986. Executive summary in health research strategy for Health For All by the Year 2000. World Health Organization, Geneva, Switzerland.

Additional reading (to be available in the course library)

Taylor, C.E. 1984. The uses of health systems research. World Health Organization, Geneva, Switzerland. Public Health Papers 78.

World Health Organization, 1983. Research for the reorientation of national health systems: report of a study group. WHO, Geneva, Switzerland. Technical Report Series 694.

World Health Organization, 1988. Health systems research in action: case studies from Botswana, Columbia, Indonesia, Malaysia, the Netherlands, Norway, and the United States of America. WHO, Geneva, Switzerland.

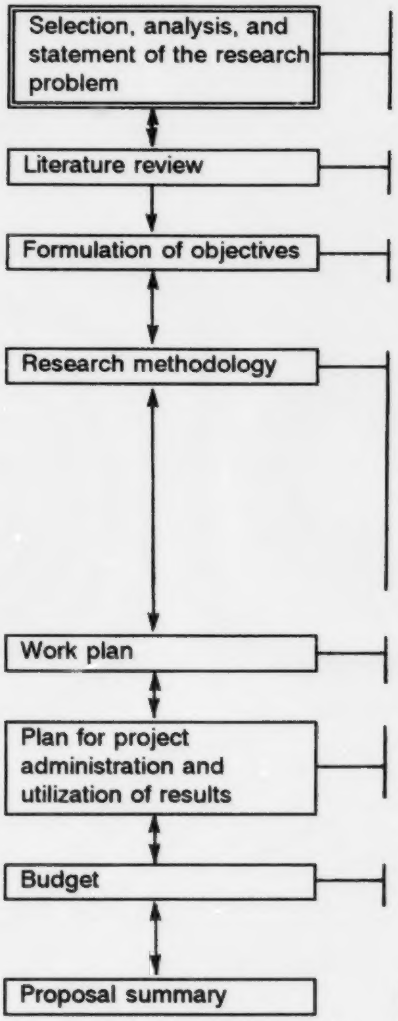
World Health Organization, 1990. Health systems research: background document at the World Health Assembly technical discussions, May 1990. WHO, Geneva, Switzerland. A43/Technical Discussions/3.

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 3:

IDENTIFYING AND PRIORITIZING PROBLEMS FOR RESEARCH

Steps in the development of an HSR proposal



Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	

N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 3: IDENTIFYING AND PRIORITIZING PROBLEMS FOR RESEARCH

OBJECTIVES

At the end of this session you should be able to:

1. Identify criteria for selecting health-related problems to be given priority in research
2. Work in a small group, using the criteria identified, to set priorities for research
3. Using a group consensus technique, select an appropriate subject for a research proposal that will be developed by your group during the course.

I. Problem identification

II. Criteria for prioritizing problems for research

Note

If topics have been selected **before** the workshop, either by health managers who asked for the study or by the participants together with their health managers and community leaders, **go straight to Module 4**. If the participant teams need to reexamine the research topics they selected before the workshop, section II of Module 3 can be used with Module 4.

I. PROBLEM IDENTIFICATION

If the answer to the research question is obvious, we are dealing with a **management problem** that may be solved without further research. If, for example, in the sanitation project essential building materials, such as cement, have been unavailable for a large part of the project period, one should try to ensure the supply of cement rather than embark on research to explore the reasons why the project did not reach its targets.

In the previous module, a number of research questions were presented that may be posed at the various levels of the health system.

These questions can be placed in three broad categories, depending on the type of information sought:

1. **Description of health problems required for planning interventions.**

   Planners need to know the magnitude and distribution of health needs as well as of health resources, to formulate adequate policies and plan interventions.

2. **Information required to evaluate ongoing interventions** with respect to:

   - Coverage of health needs
   - Coverage of target groups
   - Quality
   - Cost
   - Effects/impact

   to assess progress and the need for adjustment on a routine basis.

3. **Information required to define problems situations** arising during the implementation of health activities, **to analyze possible causes to find solutions.**

Although research in support of planning and evaluation (categories 1 and 2 mentioned above) is an important focus for HSR, the modules will concentrate on the third category, because mid-level managers are frequently confronted with problems of this type. It is assumed, however, that research skills acquired in the present course will be of use in the broader field of planning and evaluation as well.

Whether a problem situation requires research depends on three conditions:[1]

1. There should be a **perceived difference or discrepancy** between what exists and the ideal or planned situation;

2. The **reason(s)** for this difference should be **unclear** (so that it makes sense to develop a research question); and

3. There should be **more than one possible answer** to the question or solution to the problem.

---

[1] This paragraph has been adapted from Fisher et al. (1983).

For example:

Problem situation

In District X (pop. 145,000), sanitary conditions are poor (5% of households have latrines) and diseases connected with poor sanitation, such as hepatitis, gastroenteritis, and worms, are very common. The Ministry of Health has initiated a sanitation project that aims at increasing the number of households with latrines by 15% each year. The project provides materials and the population should provide labour. Two years later, less than half of the target has been reached.

Discrepancy

35% of the households **should have** latrines, but only 15% **do have** them.

Research question

What factors can explain this difference?

Possible answers

1. **Service-related factors**, such as forgetting to adequately inform and involve the population, bottlenecks in the supply of materials, differences in training, and effectiveness of sanitary staff.
2. **Population-related factors**, such as situations where community members lack an understanding of the relationship between disease and sanitation or have a greater interest in other problems.

II. CRITERIA FOR PRIORITIZING PROBLEMS FOR RESEARCH

Because HSR is intended to provide information for decision-making to improve health care, the selection and analysis of the problem for research should involve those who are responsible for the health status of the community. This would include managers in the health services and in related agencies, health-care workers, and community leaders, as well as researchers.

Each problem that is proposed for research has to be judged according to certain guidelines or criteria. There may be several ideas to choose from. Before deciding on a research topic, each proposed topic must be compared with all other options. The **guidelines or criteria** discussed on the following page can help in this process:

Criteria for selecting a research topic

1. Relevance
2. Avoidance of duplication
3. Feasibility
4. Political acceptability
5. Applicability
6. Urgency of data needed
7. Ethical acceptability

1. Relevance

The topic you choose should be a priority problem. Questions to be asked include:

- How large or widespread is the problem?
- Who is affected?
- How severe is the problem?

Try to think of serious health problems that affect a great number of people or of the most serious problems that are faced by managers in the area of your work.

Also, consider the question of **who** perceives the problem as important. Health managers, health staff, and community members may each look at the same problem from different perspectives. Community members, for example, may give a higher priority to economic concerns than to certain public health problems. To ensure full participation of all parties concerned, it is advisable to define the problem in such a way that all have an interest in solving it.

Note

If you do not consider a topic relevant, it is not worthwhile to continue rating it. In that case, you should drop it from your list.

2. Avoidance of duplication

Before you decide to carry out a study, it is important that you find out whether the suggested topic has been investigated before, either within the proposed study area or in another area with similar conditions. If the topic has been researched, the results should be reviewed to explore whether major questions that deserve further investigation remain unanswered. If not, another topic should be chosen.

Note

Also, consider carefully whether you can find answers to the problem in already available, unpublished information and from common sense. If so, you should drop the topic from your list.

3. Feasibility

Look at the project you are proposing and consider the complexity of the problem and the resources you will require to carry out your study. Thought should be given first to personnel, time, equipment, and money that are locally available.

In situations where the local resources necessary to carry out the project are not sufficient, you might consider resources available at the national level; for example, in research units, research councils, or local universities. Finally, explore the possibility of obtaining technical and financial assistance from external sources.

4. Political acceptability

In general it is advisable to research a topic that has the interest and support of the authorities. This will increase the chance that the results of the study will be implemented. Under certain circumstances, however, you may feel that a study is required to show that the government's policy needs adjustment. If so, you should make an extra effort to involve the policymakers concerned at an early stage, to limit the chances for confrontation later.

5. Applicability of possible results and recommendations

Is it likely that the recommendations from the study will be applied? This will depend not only on the blessing of the authorities but also on the availability of resources for implementing the recommendations. The opinion of the potential clients and of responsible staff will influence the implementation of recommendations as well.

6. Urgency of data needed

How urgently are the results needed for making a decision? Which research should be done first and which can be done later?

7. Ethical acceptability

We should always consider the possibility that we may inflict harm on others while carrying out research. Therefore, review the study you are proposing and consider important ethical issues such as:

- How acceptable is the research to those who will be studied? (Cultural sensitivity must be given careful consideration).

- Can informed consent be obtained from the research subjects?

- Will the condition of the subjects be taken into account? For example, if individuals are identified during the study who require treatment, will this treatment be given? What if such treatment interferes with your study results?

These criteria can be measured by the following rating scales:

SCALES FOR RATING RESEARCH TOPICS

Relevance

1. = Not relevant
2. = Relevant
3. = Very relevant

Avoidance of duplication

1. = Sufficient information already available
2. = Some information available but major issues not covered
3. = No sound information available on which to base problem-solving

Feasibility

1. = Study not feasible considering available resources
2. = Study feasible considering available resources
3. = Study very feasible considering available resources

Political acceptability

1. = Topic not acceptable to high level policymakers
2. = Topic more or less acceptable
3. = Topic fully acceptable

Applicability

1. = No chance of recommendations being implemented
2. = Some chance of recommendations being implemented
3. = Good chance of recommendations being implemented

Urgency

1. = Information not urgently needed
2. = Information could be used right away but a delay of some months would be acceptable
3. = Data very urgently needed for decision-making

Ethical acceptability

1. = Major ethical problems
2. = Minor ethical problems
3. = No ethical problems

Note: If you have already analyzed your problem in Module 4, skip the exercise and go straight to group work.

EXERCISE: The Chobe District Health Team, selecting a research project

(to be carried out in plenary, ½ hour, if this is the first discussion of possible research topics)

Introduction to the exercise

The Chobe District Health Team, responsible for the health of a population of 125,000, has to choose between two important study topics:

Possibility 1

The first possibility is **a study into methods for motivating communities to provide voluntary labour for the installation of water systems.**

In Chobe District, streams are used as latrines as well as sources of domestic water. Morbidity surveys show an extremely high prevalence of diarrhea and chronic infections with intestinal parasites. UNICEF has offered to supply free plastic pipes if the villagers will provide labour to install community water systems from protected springs.

Because the terrain is rocky, it will take a great deal of labour to dig trenches in which to lay the plastic pipes. Burying the pipes would seem necessary as it is not uncommon that villagers cut into exposed pipes to obtain water. The motivation among male villagers to dig the trenches, however, is not high; the belief that water has a purifying power and that anything dissolved in the streams cannot possibly be dangerous appears to be a stumbling block to increasing motivation.

The District Health Team, encouraged by UNICEF to take action and aware that in pilot projects in neighbouring districts the population was successfully motivated, now wants to take action. So far, invitations to village leaders to attend training programs designed to demonstrate how they could develop and maintain their own water systems remain unanswered.

Proposed study: The District Health Team proposes to undertake a rapid assessment in four villages, two in the pilot project located in the neighbouring district and two in Chobe District, to find out:

- What factors have contributed to the involvement of the community in the project in the neighbouring district;
- Whether it would be feasible to increase the population's interest in the project by providing more detailed information on the relationship between contaminated water and disease;
- Whether it would be possible to keep the burying of pipes to a minimum, if the *whole* population (males and females, youngsters and adults) were involved in the project, and representatives of all these groups participated in the village water committee.

The team would plan to interview project authorities in the neighbouring district and conduct three focus group discussions in each village: one with males, one with females, and one with males and females combined, to explore the questions above.

EXERCISE (continued)

Possibility 2

The second possibility is to **examine the reasons for the assumingly increasing perinatal mortality among children delivered at the District Hospital.** Various community members have expressed their concern over expectant mothers returning home from the District Hospital "without babies." They are demanding an explanation from the health workers before they approach the government with the problem.

The District Health Team wishes to prevent the community from approaching the politicians. First of all it wants to assess whether the perinatal mortality among children born at the District Health Centre has indeed gone up over the past 5 years and, if so, how this could be explained.

Proposed Study: The District Health Team would plan to analyze the records of the maternity ward over the past 10 years to investigate whether there indeed has been an upward trend in the proportion of deaths. What is the cause of each recorded death? Could some have been prevented either by more intensive care in the maternity ward or by earlier prenatal care and referral of high risk cases by TBAs and peripheral units? What other reasons may there have been for the deaths?

In addition to the record review, the District Team would plan to interview maternity staff in the District Hospital and in five peripheral health units. Also, TBAs would be interviewed and focus group discussions would be held with women in the age group of 15-45 years in five villages.

Directions

Rate the two proposals in small groups, using the form on the following page, and prepare to defend your first choice in plenary. (When rating the topics on the criteria, you can either refer to the "Scales for Rating Research Topics" presented right before this exercise or use the summary scales at the bottom of the rating sheet.)

EXERCISE (continued)

Proposed topic	1. Relevance	2. Avoidance of duplication	3. Feasibility	4. Political acceptability	5. Applicability	6. Urgency of data needed	7. Ethical acceptability	Total
1. Community water systems								
2. Perinatal mortality								

Rating scale: 1 = low, 2 = medium, 3 = high.

GROUP WORK **(About 2¼ hours if this is the first discussion)**

Meet in your working groups to list and rank the research topics that you want to consider for the research proposal you will develop, as a team, during the course.

1. Choose a reporter who will present in plenary the topics you have considered and your final choice.

2a. **If this is the first discussion of possible research topics**, it is suggested that each group member write one or two topics on a piece of paper. Then, all the topics can be **listed** on a flip chart and **briefly discussed** to eliminate duplications. **Omit proposals that are obviously less relevant or too difficult to carry out**. Ideally, you should select no more than five to six topics for individual rating.

2b. **If a preselection has already been done in the field**, and/or different possibilities for research topics have emerged during problem analysis in Module 4, consider the two or three topics you have to choose from.

3. Each group member should then rate the selected proposals **individually**, using the scoring sheet on the following page. Then, for each proposal, the scores of the groups members for each criterion should be tallied on a flip chart and the total scores calculated. Discuss marked differences in individual ratings because these may be due to different interpretations of the criteria.

4. Then thoroughly review the (two) proposals that received the highest scores. At this point it is important to take into account **which proposed study could most realistically be carried out** by your group within the coming 4-6 months. Ideally, all group members should be able to participate actively and benefit directly from the results.

5. Finally, select the topic for your upcoming research project and prepare a brief presentation for the other members of your course. Present the flip chart with the scores and provide reasons for your final choice.

6. Carefully document the arguments supporting your first choice and keep them for use in later sessions.

GROUP WORK (continued)

Rating sheet for group work

Proposed topic	Criteria for selection of research topic							Total
	1. Relevance	2. Avoidance of duplication	3. Feasibility	4. Political acceptability	5. Applicability	6. Urgency of data needed	7. Ethical acceptability	
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								

Rating scale: 1 = low, 2 = medium, 3 = high.

Module 3: IDENTIFYING AND PRIORITIZING PROBLEMS FOR RESEARCH

Note

If you wish the participants to make preliminary selection of their research problems in the field, this module should be sent to participants and relevant managers at least 6-8 weeks before the course starts. Preferably a facilitator/trainer will be present as well to provide technical support during the selection process. Otherwise a set of guidelines could be prepared to assist the participants and their managers. It is best to ask each group to come with at least two or three potential research problems, in case one or more of the topics, on further analysis, proves infeasible.

- If the preliminary selection of research problems has been made before the workshop, you can proceed to Module 4. Section I of Module 4 focuses on Problem Analysis.
- When this is completed, the second section of Module 4 asks the participant groups to reconsider their research problems. If the groups find their research problems involve the investigation of several subproblems that cannot be combined in one study, you may ask them to use section II of Module 3 to rank the subproblems before making their final selection.

If no selection has been made in the field, the schedule below can be followed.

Timing and teaching methods

30 minutes	Introduction and discussion
30 minutes	Exercise: Chobe District including explanation of group discussion method
2½ hours	Group work
1 hour	Group reporting (15 minutes per group)
4½ hours	TOTAL TIME

Materials

- Flip chart and markers,
- Sticky stuff or clear tape, and
- Photocopies of the rating sheet for group work, if possible.

Introduction and discussion

Discuss the process of problem identification (section I of the module) and criteria for prioritizing problems for research (section II). Be sure you are thoroughly familiar with the concepts but **let the criteria as well as the definitions come, as much as possible, from the group.**

Exercise: The Chobe District Health Team - selecting a research project

- Divide the participants into groups of 3-4 people so that they can do the exercise in plenary with minimal displacement.
- Ask the participants to carefully read both examples. Briefly explain how to use the rating sheet at the end of the exercise. Ask the groups to rate both examples, but let certain groups start with the first and others with the second. Give them 15-20 minutes at most to complete the rating process.
- Prepare a flip chart with the list of criteria and write the ratings of all groups for both topics down. Identify the criteria on which the rating differ most (for example one groups rates a 3 for feasibility of the perinatal mortality study and another a 1) and ask each group to explain why it decided on its score. The differences may be due to a different understanding of the criteria or to a different perception of the problems and the proposed methodology. Special attention should be given to uniformity in the interpretation of the criteria. After completing this exercise, participants should be able to see the importance of looking at all dimensions of a problem before moving ahead to select their own topics.

  Note: There are no right or wrong answers to the exercise. Either proposal may receive priority for different reasons.

Group work

- Review the logistics of supervising the group work with the other trainers before the session starts. Choose meeting places for the four groups and be sure flip charts, sticky stuff or tape, and markers are available.
- When the selection process for choosing group topics is introduced, make sure that the participants realize they are involved in more than a "hypothetical exercise". Participants should be made aware that they will be developing the topics they select throughout the course and that they will carry out these projects on their return home.
- Familiarize yourself thoroughly with the selection procedures as presented in the group work. These procedures are a simplified version of the **nominal group discussion technique**. Often a priority topic emerges after one round of discussions followed by individual rating and summarizing the individual scores on flip chart.

If the total scores of two or three topics are very close, they may be discussed again. It may be useful, in particular, to reexamine criteria that were scored differently by the group members. Special attention should be paid in this round to the question of whether the results of the study will be applicable and whether group members feel they can realistically carry out the research within the 4-6 months allocated.

- As facilitator, you may chair this first group work session but you should not dominate the discussion.

  You should make sure that the procedures run smoothly and that project topics that duplicate research already completed or that are not feasible are dropped before the rating starts. You should help insure, as well, that no important proposals or initiatives are dropped because the group is not yet familiar with handling the criteria.

- At the end of the group work for selecting projects, assist the reporter in editing and writing the list of topics debated by the group on a flip chart, along with the record of the combined group rating. Ask the secretarial staff to type out lists of topics considered and voting results for possible inclusion as an annex of the final course report.

Note

During this first group work session, it is not important which facilitator works with which group. Once the topics have been selected, final assignments of facilitators to specific groups may be made after considering the facilitators' familiarity with the topics chosen.

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 4:

ANALYSIS AND STATEMENT OF THE PROBLEM

Steps in the development of an HSR proposal

Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	

N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 4: ANALYSIS AND STATEMENT OF THE PROBLEM

OBJECTIVES

At the end of this session you should be able to:

1. Analyze a selected problem and the factors influencing it.
2. Prepare the statement of the problem for the research proposal you will be developing during the course.

I. Analyzing the problem

II. Deciding on the scope and focus of the research

III. Formulating the problem statement

I. ANALYZING THE PROBLEM

In HSR, the researcher is often required to do research on a problem with which he or she is not very familiar. Health workers and managers or community members may be much more familiar with the problem. But even they may never have given critical attention to the various aspects of the problem.

A systematic **analysis of the problem**, completed jointly by the researchers, health workers, managers, and community representatives is a very crucial step in designing the research because it:

1. Enables those concerned to pool their knowledge of the problem,
2. Clarifies the problem and the possible factors that may be contributing to it, and
3. Facilitates decisions concerning the focus and scope of the research.

Note

In a workshop setting, it may be impossible to obtain input from **all** concerned. The opinion of people who cannot be consulted (e.g., local health staff or community leaders) should be solicited immediately after the workshop, before finalizing the proposal.

Steps in analyzing the problem

Step 1 Clarify the viewpoints of managers, health-care workers, and researchers in relation to the problem

Areas of concern within the health system are often expressed in broad or vague terms by managers and health care workers. For example,

"Care of diabetic patient needs review."
"Outpatient services must be evaluated."
"Bypassing of peripheral facilities should be investigated."

During initial discussions with managers and health-care workers who are involved in the problem area, clarify the issues by **listing all the problems** in the area of concern as they **perceive** them.

Remember that a problem exists when there is a discrepancy between "what is" and "what should be." (See Module 3.) Therefore, the perceived problems should be worded in such a way as to illustrate this discrepancy.

For example, health-care managers and workers may determine that the general concern that "care of diabetic patients needs review" includes the following problems:

- Insufficient awareness of diabetes and of self care measures among diabetic patients and their relatives;

- Insufficient peripheral facilities for long-term follow-up care;
- Excessive rate of readmissions among diabetics;
- Inappropriate management of complications in diabetic patients;
- High rate of diabetic complications;
- Poor compliance of patients with therapy; etc.

Step 2 Further specify and describe the core problem.

You should then try to identify the **core** problem and quantify it. Looking at the example discussed in Step 1, you may decide that the core problem includes:

- The high rate of readmissions among diabetes (a discrepancy between what is and what should be in the services);
- The high rate of diabetic complications (a discrepancy between what is and what should be in the health of the patients);

You should attempt to describe more elaborately:

- The **nature** of the problem; the discrepancy between "what is" and what you prefer the situation to be, in terms of readmissions and/or complications;
- The **distribution** of the problem - who is affected, when, and where; and
- The **size** and **intensity** of the problem - is it widespread, how severe is it, what are its consequences (such as disability, death, and waste of resources).

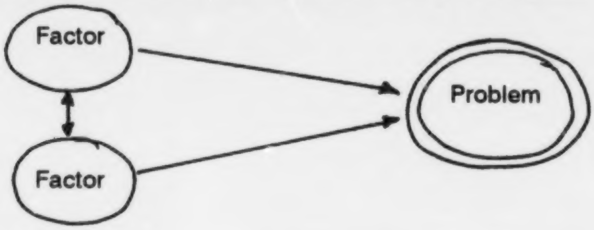
Step 3 Analyze the problem.

After identifying the core problem you should:

- Identify factors that may have contributed to the problem.
- Clarify the **relationship** between the problem and contributing factors.

It is helpful to visualize these interrelationships in the form of a **DIAGRAM**. The basic principles of constructing such a diagram are illustrated below.

Figure 4.1. Elements of a problem analysis diagram.


Factor
Factor
Problem

Perceived problems and factors contributing to these problems may be placed in "balloons." The relationships between them can be indicated by arrows that can be either one-way arrows (for cause-effect relationships) or two-way arrows (for mutual relationships). The core problem can be identified by drawing a double line around it.

Analysis of the problem involves several substeps.

Step 3.1 Write down the core problem(s) as defined in Step 2 in the centre of a blackboard or flip chart.

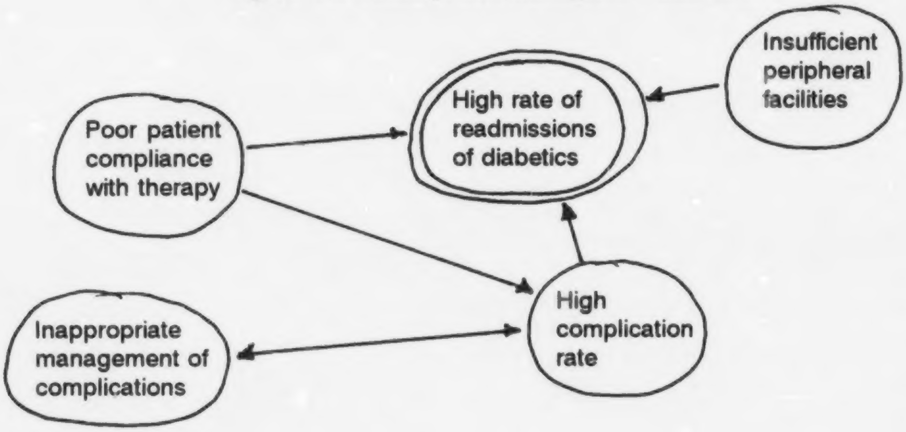
Step 3.2 Brainstorm on possible causes or factors contributing to the problem.

It is important that the viewpoints of managers, health-care workers or researchers brought up during Step 1 are all included. Discuss the relationships between the different factors and the problem.

If desired, participants may use separate cards or pieces of paper on which to write possible contributing factors. The cards may be pinned or taped around the core problem on the board or flip chart and moved, revised, or eliminated as necessary, during development of the diagram.

The initial diagram of the diabetes problem might look like this:

Figure 4.2. Initial problem diagram - diabetes.


Insufficient peripheral facilities
High rate of readmissions of diabetics
Poor patient compliance with therapy
High complication rate
Inappropriate management of complications

Note that many of the "perceived problems" mentioned in step 1 are related to each other, in a cause-effect relationship (e.g., poor compliance with therapy contributing to a high rate of complications) or in a mutual relationship (inappropriate management of complications contributing to a high rate of complications, but congestion in the diabetic service unit due to the high number of patients with complications in turn leading to inappropriate services).

Further note that the high rate of readmissions of diabetics has now emerged as the core problem. We may **circle it twice**, to distinguish if from the balloons that indicate contributing factors.

As you can see, this initial diagram suggests that further development of the analysis could proceed in at least three directions, i.e., analysis of factors related to:

- Availability and accessibility of services (insufficient peripheral facilities);
- Quality of the services provided (inappropriate management of complications); and
- The patient, family, and community (poor patient compliance with therapy).

These sets of factors will appear in many studies of patient compliance. In reality they usually prove to be **closely intertwined.** Patients' compliance with therapy depends not only on their own educational and cultural background, for example, but also on the quality of the services provided and on the physical accessibility of the services.

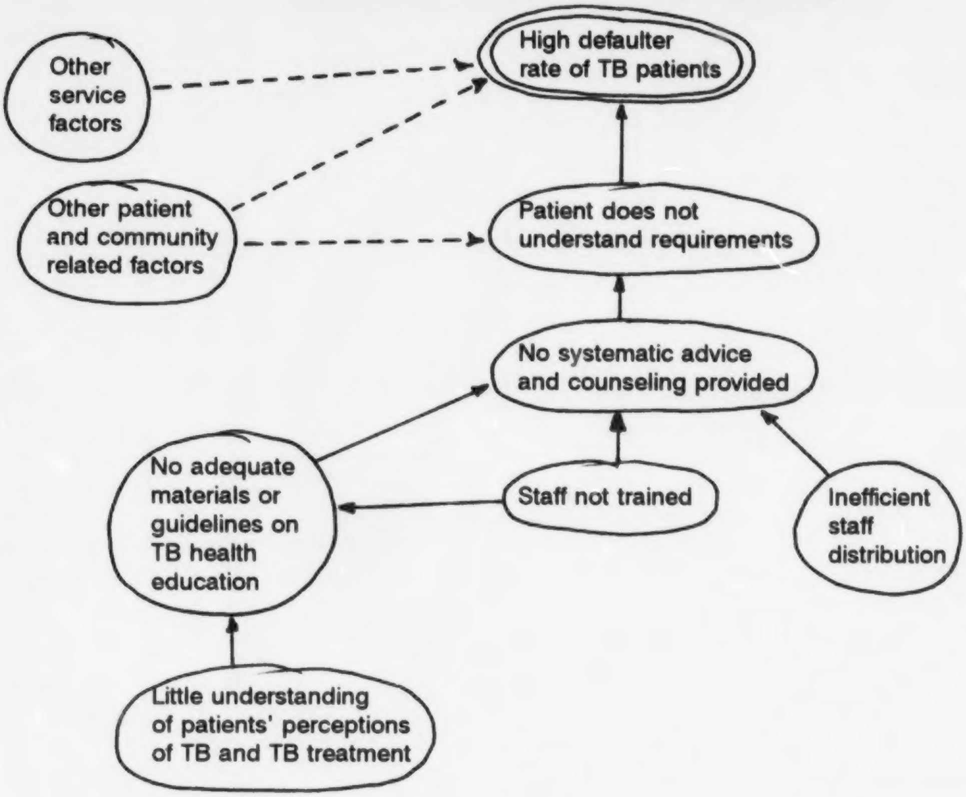
Step 3.3 Identify further contributing factors.

Extend the problem analysis diagram further by identifying additional factors that could have contributed to or aggravated the problem. It may be possible to identify several "generations" of predisposing factors.

Let us take another example: High defaulter rate among tuberculosis (TB) patients (Fig. 4.3).

It is desirable to continue identifying underlying contributing factors until you reach basic factors that need to be modified to solve the problem, and that **can be modified** within the existing context. This will facilitate the formulation of research projects that can **provide useful information for decision-making.** This process of continued analysis will necessitate several revisions or extensions of the initial analysis diagram. The final version should encompass all the critical factors that may be contributing to the problem to be studied.

Figure 4.3. Identifying several "generations" of predisposing factors causing high defaulter rate among TB patients.


High defaulter rate of TB patients
Other service factors
Other patient and community related factors
Patient does not understand requirements
No systematic advice and counseling provided
No adequate materials or guidelines on TB health education
Staff not trained
Inefficient staff distribution
Little understanding of patients' perceptions of TB and TB treatment

Step 3.4 Attempt to organize related factors together into larger categories, and develop your final draft of the diagram.

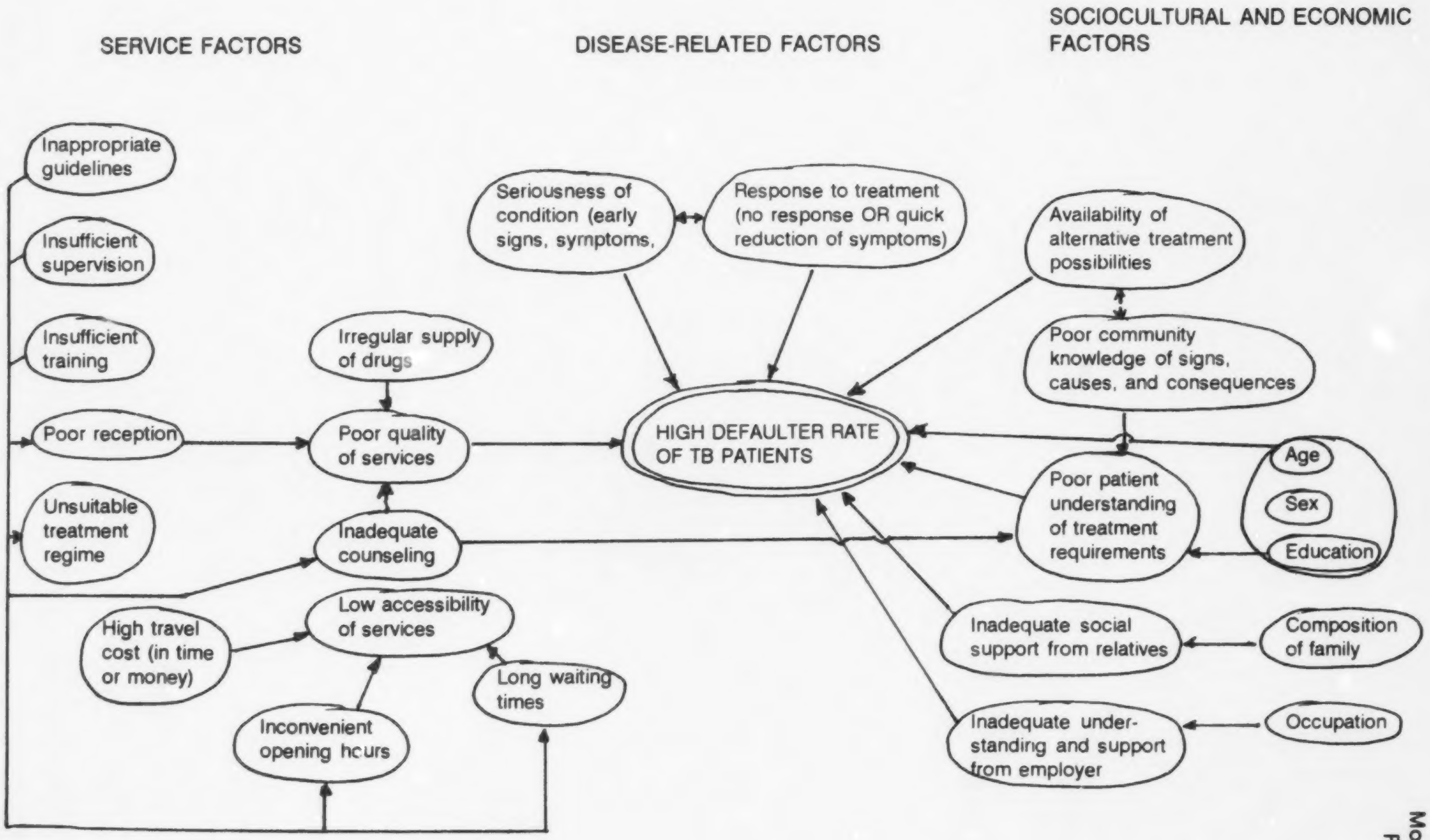
This final step in organizing the diagram will help you not to overlook important factors and will make it easier to develop the data collection tools in a systematic way.

For example, the revised diagram focusing on the "high defaulter rate" among tuberculosis patients may group contributing factors into three main categories:

- sociocultural factors;
- service-related factors; and
- disease-related factors.

For our TB example, we may categorize the factors contributing to defaulting into these three main groups (see Figure 4.4).

Figure 4.4. Revised problem analysis diagram of factors contributing to high defaulter rate among TB patients.


SERVICE FACTORS
DISEASE-RELATED FACTORS
SOCIOCULTURAL AND ECONOMIC FACTORS
Inappropriate guidelines
Insufficient supervision
Insufficient training
Poor reception
Unsuitable treatment regime
Irregular supply of drugs
Poor quality of services
Inadequate counseling
Low accessibility of services
High travel cost (in time or money)
Long waiting times
Inconvenient opening hours
Seriousness of condition (early signs, symptoms,
Response to treatment (no response OR quick reduction of symptoms)
HIGH DEFAULTER RATE OF TB PATIENTS
Availability of alternative treatment possibilities
Poor community knowledge of signs, causes, and consequences
Poor patient understanding of treatment requirements
Age
Sex
Education
Inadequate social support from relatives
Composition of family
Inadequate under-standing and support from employer
Occupation

Sociocultural factors, which may be:

- Personal factors such as age, sex, education, occupation, and composition (and possible support) of the family;
- Community determined factors such as:
  - Poor or conflicting community knowledge of signs and causes of TB and of requirements for TB treatment,
  - Availability of other types of treatment in the community,
  - Preference for other types of treatment, and
  - Poor understanding and support from employer.

Service factors, such as:

- Low availability and accessibility of services (including cost of treatment);
- Poor clinic management (unsuitable treatment regime, inadequate counseling, etc.).

Disease-related factors such as:

- Seriousness of the patient's condition at onset of treatment; and
- Physical response to the treatment (complications? quick recovery?).

Note

If the research will be merely a **description** of a situation or a health problem (size, distribution) or a routine evaluation (see Module 3), it may not be appropriate to make an analytical diagram looking for **causes** of a problem. Here, the problem is lack of information.

For example, we may need information on knowledge, attitudes, and practices (KAP) of teenagers with respect to bilharzia to develop adequate health-education materials for schools. In this case, we can make a different diagram listing the relevant KAP that we want in the study. We can, however, go one step further and list the factors that may (have) contribute(d) to the development of the teenagers' KAP.

II. DECIDING ON THE FOCUS AND SCOPE OF THE RESEARCH

After this detailed analysis of the problem, it is important to reconsider the focus and scope of the research. Several issues are particularly important to consider, including:

1. **Usefulness of the information**. Will the information that would be collected on this problem help improve health and health care? Who would use the findings related to the factors in the diagram that would be studied? How would the findings be used?

2. **Feasibility**. Is it feasible to analyze all the factors related to the problem in the 4-6 months available for research?

3. **Duplication**. Is some of the information related to factors in the diagram already available? What aspects of the problem need further research?

Review your problem diagram with these issues in mind. If your problem is complex and has many possible contributing factors, identify and demarcate the boundaries of possible smaller research topics. If there is more than one possible topic, use the selection criteria and ranking method that were described in Module 3 to assist you in your final decision concerning the focus and scope of your research.

Note of caution

The dissection of the diagram into different parts and selection of one part for research is not advised if insufficient insight exists into the nature, relative weight, and interrelations of the various factors contributing to the problem. You would risk concentrating on marginal factors and coming up with marginal solutions. It is, for example, inadvisable to concentrate only on community factors or only on service factors to explain underutilization of services if you don't know how these factors are interrelated and where the main problem is.

An **exploratory study** would then be indicated, limited rather in the number of informants than the number of factors included in the study (see Modules 9, 10, and 11).

III. FORMULATING THE PROBLEM STATEMENT

The first major section in a research proposal is "Statement of the problem."

Why is it important to state and define the problem well?

Because you will find that a clear statement of the problem:

- Is the foundation for the further development of the research proposal (research objectives, methodology, work plan, budget, etc.);
- Makes it easier to find information and reports of similar studies from which your own study design can benefit;
- Enables you to systematically point out why the proposed research on the problem should be undertaken and what you hope to achieve with the study results. This is important to highlight when you present your project to community members, health staff, the relevant ministry, and donor agencies who need to support your study or give their consent.

What information should be included in the statement of the problem?

1. A **brief** description of socioeconomic and cultural characteristics and an overview of health status and the health-care system in the country or district **in as far as these are relevant to the problem**. Include a few illustrative statistics, if available, to help describe the **context** in which the problem occurs.

2. A concise **description** of the nature of the problem (the discrepancy between what is and what should be) and of its size, distribution, and severity (who is affected, where, since when, and what are the consequences for those affected and for the services?)

3. An **analysis** of the major factors that may influence the problem and a convincing argument that available knowledge is insufficient to solve it.

4. A brief description of any solutions that have been tried in the past, how well they have worked, and why further research is needed.

5. A description of the type of information expected to result from the project and how this information will be used to help solve the problem.

6. If necessary, a short list of definitions of crucial concepts used in the statement of the problem.

   A list of abbreviations may be annexed to the proposal, but each abbreviation also has to be written out in full when introduced in the text for the first time.

GROUP WORK

1. **Select a reporter who will present the statement of the problem in plenary.**

2. **Discuss comments you received in the previous plenary session on the choice of your topic and revise your topic, if necessary.**

3. **Make an analysis diagram of the most important components of the problem or the most important factors that you think are influencing it. Use a blackboard or a flip chart and, if possible, separate cards for each factor. (See part I of this module for details on the steps in this process.) After making your initial diagram, try to rearrange the factors identified into broader categories.**

GROUP WORK (continued)

4. Decide whether the implementation of your problem analysis diagram is feasible. In case of doubt, consider two possibilities:

   a. All factors seem important and interrelated; you could not easily split the diagram up into possible substudies. Just continue and we will come back to possible ways of increasing the feasibility of the study when discussing Module 9 (Study Type), Module 10 (Data Collection Techniques), and Module 11 (Sampling).

   b. The diagram is so complex that several studies would be necessary to cover it. If so, demarcate the boundaries of possible projects and use the criteria and ranking system in Module 3 to select one of the subproblems as the focus for your project.

   Note: Groups that selected their general problem areas before coming to the course may want to spend an hour or two at this point systematically ranking and choosing between possible topics within their general problem areas, using the instructions in Module 3, part II.

5. Prepare a **first draft** of 2-3 pages of the statement of the problem for the topic you have selected in your group.

   - First, prepare an outline covering items 2 through 5 in the list presented just before this group work session.

   - Then, prepare one or two paragraphs of "background information" that places the problem in its context and will be used as the introduction to the statement of the problem.

   - Finally, define crucial terms and explain abbreviations, if necessary.

6. Identify information you need now, from the literature or from key informants, to help you focus your study and to further develop your statement of the problem. Ask course facilitators to give you assistance, if necessary.

7. Present your flip charts with the problem analysis diagram and outline of your problem statement in plenary. Justify the need for your study (¼ hour per group). See the guidelines for the discussion of the presentations on the following page.

8. Keep all materials presented, as well as your notes on the comments received in the plenary session, for use during further development of your proposal. Send the first draft of your statement of the problem for typing.

Guidelines for the plenary session following group work: presentation and discussion of problem statements

Each group should present its problem analysis diagram and problem statement in the plenary session. Facilitators and members of other groups should comment and provide suggestions for improvement.

Guideline for presentation

- Each presentation should take about 10-15 minutes.
- Present the problem analysis using the diagram. Indicate, if necessary, the boundaries of the possible studies focusing on various aspects of the problem.
- Present the problem statement. It should be available to the audience either on flip chart or overhead projector or in written version.

Guideline for discussion

As each team presents its work, consider the following issues for discussion:

- Are the contributory factors and their relationships clearly and logically described in the problem diagram?
- Have the boundaries of the project been clearly defined? Can the project be completed in 4-6 months, or should the focus of the project be narrowed further?
- Will the information collected be sufficiently specific to help solve the problem?
- Is there too little, sufficient, or too much background information in the statement of the problem?
- Is the problem clearly described? (nature, distribution, magnitude, severity)
- Does the justification for selecting the project appear to be rational?

Module 4: ANALYSIS AND STATEMENT OF PROBLEM

Timing and teaching methods

¾ hour	Introduction and discussion
3-5 hours	Group work (the group work in Module 4 will take about 3 hours. If the participants also use the criteria and ranking method presented in Module 3 to choose between possible research topics in the general problem area they have selected, the session will take about 2 hours more.)
1 hour	Plenary
5-8 hours	TOTAL TIME

Materials

- Blackboard, flip charts, and tape or sticky stuff;
- Several markers for each group; and
- Optional: cards or sheets of paper cut in two or three pieces (at least 20 "cards" per group).

Introduction

This module is designed to assist health staff, researchers, and managers to work together to analyze the problem and prepare a problem statement.

It would be beneficial to include health service managers and community leaders who are concerned with the problem and who are likely to use the findings as resource persons during the group work. Resource persons could include, for example, the District Medical Officer, the Hospital Manager, the Coordinator of the Tuberculosis Program, the Mayor or traditional leader, etc.

Presentation and discussion

It is extremely important that participants understand the principle of making a diagram, with a problem in the centre and contributing factors grouped around the problem. When you give examples, get them to participate actively, identifying what the core problem is and in what direction the arrows should point.

When building up the diagrams, you might consider working with different overhead sheets on top of each other.

The final TB diagram, for example, could consist of 4 sheets:

- The problem,
- Sociocultural factors (including personal and community factors),
- Service factors, and
- Disease-related factors.

Group work

This is the first time during the workshop that the participants will work in small groups. They will experience the initial difficulties of establishing group-dynamics.

Furthermore, many participants may never have had the experience of systematically analyzing a problem before.

The topic for the first group work is particularly complex. Adequate selection of a problem is crucial for subsequent development of the project. To ensure that the group work is productive in the process of problem analysis, the **workshop facilitator should assume the role of chairperson** for this session. This will also help ensure optimal utilization of the resource persons.

In all subsequent modules, the participants should select their own group leader and reporter for each group work session.

Suggestions concerning various steps in the group work process are given below:

1. Listing viewpoints

- Each group member should silently and independently write a list of problems and contributory factors that are perceived to exist in the general problem area. Each factor should be listed on an individual card. (Remember that these statements are **perceptions** based on personal knowledge and experience. It is not necessary to produce supportive evidence at this stage.)

  Reassure participants that evidence can be gathered later during the literature search and screening of reports and interviews with key informants.

- Display **all** problems and contributory factors identified by group members on flip chart paper so that the entire list is visible to all members. (At this stage, **every** perceived problem and factor should be written down **without any discussion**. This will help ensure that dominant group members do not override the perceptions of more timid members.)

2. Constructing a problem analysis diagram

- Place what appears to be the core problem in the centre of the flip chart or blackboard. Contributing factors should be written or "pinned" around the problem by the participants. Relationships between these factors and the problem and among different factors should be indicated by arrows.

- If participants cannot decide at this point which is the core problem among a cluster of problems, let them select **any** of the problems that seem **major** to them and place them in the centre of the flip chart.

- Make sure that **every** viewpoint listed in Step 1 is represented in the diagram by the time the group finishes. Encourage analytical thinking by asking participants to determine which way the arrows should point between the various "balloons."

- **Aim to use only one sheet of flip chart paper** for the initial analysis. This forces participants to consider each other's viewpoints. If you use loose cards, each participant can pin his own "contributing factor" around the problem in the centre.

- Now have the participants identify one (or two) core problem(s) to which all others contribute and rephrase those problems, if necessary.

- Redraw the diagram, reorienting the position of the "balloons." Place the core problem(s) in the middle and add the other factors already identified, encouraging the placement of balloons in appropriate places.

  When regrouping the contributing factors, try to classify them (e.g., into service factors, personal factors, community factors, factors related to the disease).

- If participants become "locked to" a particular line of thought or are unable to think of other factors, ask:

  > "What else could be causing this problem?"
  >
  > "Are there any other **service** (or **community** or **personal**, etc.) factors that could be causing it?"

  Ask participants who have personal experience with the problem to recall and describe incidents that illustrate important aspects of the problem.

- Do not expect to produce a comprehensive diagram of the problem at the first or even the second attempt. It will be necessary for the participants to **revise the diagram** many times as they acquire a deeper understanding of the problem.

3. Narrowing the focus of the project

- After the group has prepared its problem diagram be sure that it spends some time seriously considering whether the problem is too large to complete during one project of 4-6 months (considering available staff time and resources).

Make sure that participants have paid enough attention to possible interlinkages of variables in different categories. It is hardly ever advisable to omit a complete category of variables (e.g., service factors). If the research team has little indication as to where the main causes of the problem can be located, it is advisable to choose an exploratory study using smaller samples of different categories of informants to explore these main causes.

- If the participants in your workshop were able to identify problem areas or general topics for their projects in collaboration with their program managers before the course, you will have skipped Module 3. If so, you may wish to break the group work session into two parts and spend some time before the groups prepare their problem statements presenting part II of Module 3. Ask each group to use the criteria and ranking system given there to choose between possible topics in the problem area they have chosen. Then the groups can be given additional time to outline and prepare their problem statements.

4. Writing the statement of the problem

- Ask the group to list the major points they plan to include and rearrange them, if necessary, before preparing the written text for the problem statement.
- Encourage participants to use available reports to help specify their problem, and to search for information they do not have.
- Preparation of the written problem statement can be done in small groups or individually, but all group members should read each section and one person should be responsible for the final version.

Make sure that each group preserves the final version of the problem analysis diagram. It will serve as the basis for subsequently formulating specific objectives and constructing variables.

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 5:

REVIEW OF AVAILABLE LITERATURE AND INFORMATION

Steps in the development of an HSR proposal

Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 5: REVIEW OF AVAILABLE LITERATURE AND INFORMATION

OBJECTIVES

At the end of this session you should be able to:

1. **Describe** the reasons for reviewing available literature and other information during the preparation of a research proposal.
2. **Describe** the resources that are available for carrying out such a review.
3. **Prepare** index cards or computer entries that summarize important information obtained from literature or interviews with key informants.
4. **Prepare** a review of literature and other information pertaining to the research proposal that will present background data and information supporting your intended research.

Why is it important to review already available information when preparing a research proposal?

- It prevents you from duplicating work that has been done before.
- It helps you to find out what others have learned and reported on the problem you want to study. This may assist you in refining your statement of the problem.
- It helps you to become more familiar with the various types of methodology that might be used in your study.
- It should provide you with convincing arguments for why your particular research project is needed.

What are the possible sources of information?

- Individuals, groups, and organizations;
- Published information (books, articles, indexes, and abstract journals); and
- Unpublished information (other research proposals in related fields, reports, records, and computer data bases)

Where can we find these different sources?

Different sources of information can be consulted and reviewed at various levels of the administrative system within your country and internationally.

Administrative level	**Examples of resources**
Community and district or provincial levels	• Clinic and hospital based data from routine statistics, registers; • Opinions, beliefs of key figures (through interviews); • Clinical observations, reports of critical incidents, etc.; • Local surveys, annual reports; • Statistics issued at provincial, and district levels; • Books, articles, newspapers, mimeographed reports, etc.
National level	• Articles from national journals, books identified during literature searches at university and other national libraries, WHO, UNICEF libraries, etc. • Documentation, reports, and raw data from: - The ministry of health - Central statistical offices - Nongovernmental organizations

International level

- Information from:
  - Bilateral and multilateral organizations (e.g., IDRC, USAID, UNICEF, WHO),
  - Computerized searches for international literature (from national library or international institutions).

You need to develop a strategy to gain access to each source and to obtain information in the most productive manner. Your strategy may vary according to where you work and the topic under study. It may include the following steps:

- Identifying a key person (researcher or decision-maker) who is knowledgeable on the topic and asking if he or she can give you a few good references or the names of other people whom you could contact for further information;

- Looking up the names of speakers on your topic at conferences who may be useful to contact;

- Contacting librarians in universities, research institutions, the ministry of health, and newspaper offices and requesting relevant references;

- Examining the bibliographies and reference lists in key papers and books to identify relevant references;

- Looking for references in indexes (e.g., *Index Medicus*, see Annex 5.1) and abstract journals (see Annex 5.2); and

- Requesting a computerized literature search (e.g., Medline, see Annex 5.3).

Some agencies will assist with your literature search if requested by telephone or in writing. The request, however, should be very specific. Otherwise you will receive a long list of references, most of which will not be relevant to your topic. If you are requesting a computerized search it is useful to suggest key words that can be used in locating the relevant references.

Note:

Facilitators should be able to provide specific information regarding national and international facilities to assist you with the search for literature.

References that are identified:

- Should first be skimmed or read.
- Then summaries of the important information in each of the references should be recorded on separate index cards (Annex 5.4) or as computer entries. These should then be classified so that the information can easily be retrieved.
- Finally a literature review should be written.

Information on an index card should be organized in such a way that you can easily find all data you will need for your report.

For an article, the following information should be noted:

> Author(s) (surname followed by initials). Title of article. Name of journal, year; volume number: page numbers of article.
>
> **Example:**
> Gwebu ET, Mtero S, Dube N, Tagwireyi JT, Mugwagwa N. Assessment of nutritional status in pregnancy: use of a reference table of weight-for-height. Central African Journal of Medicine, 1985; 31: 193-196.

For a book, the following information should be noted:

> Author(s) (surname followed by initials). Title of book. Edition. Place: Publisher, year: number of pages in the book.
>
> **Example:**
> Abramson JH. Survey methods in community medicine. 2nd ed. Edinburgh: Churchill Livingstone, 1979: 229.

For a chapter in a book, the citation can include:

> Author(s) of chapter (surname followed by initials). Chapter title. In: Editors of book (surname followed by initials). eds., Title of book. Place: Publisher, year: page numbers of chapter.
>
> **Example:**
> Winikoff B, Castle MA. The influence of maternal employment on infant feeding. In: Winikoff B, Castle MA, Laukaran VH, eds. Feeding infants in four societies: causes and consequences of mother's choices. New York: Greenwood Press, 1988: 121-145.

This information, recorded in a standard format such as that suggested above, can then easily be used as part of your list of references for the proposal. The formats suggested above have been adopted as standard by over 300 biomedical journals and sometimes referred to as "the Vancouver System." For more information, see International Committee of Medical Journal Editors (1988). Other references in this series follow IDRC's house style.

The index card or computer entry (one for each reference) could contain quotations and information such as:

- Key words;
- A summary of the contents of the book or the article, concentrating on information relevant to your study; and
- A brief analysis of the content, with comments such as:
    - Appropriateness of the methodology;
    - Important aspects of the study; and
    - How information from the study can be used in your research.

Note

Index cards or computer entries can also be used to summarize information obtained from other sources, such as informal discussions, reports of local health statistics, and internal reports.

How do you write a review of literature?

There are a number of steps you should take when preparing a review of available literature and information:

- First, organize your index cards in groups of related statements according to which aspect of the problem they touch upon.

- Then, decide in which order you want to discuss the various issues. If you discover you have not yet found literature or information on some aspects of your problem that you suspect are important, make a special effort to find this literature.

- Finally, write a coherent discussion of one or two pages **in your own words**, using all relevant references. You can use consecutive numbers in the text to refer to your references. Then list your references in that order, using the format described in the section above on index cards. Add this list as an annex to your research proposal.

  Alternatively, you can refer to the references more fully in the text, putting the surname of the author, year of publication, and number(s) of page(s) referred to between brackets, e.g., (Shiva 1988: 15-17). If this system of citation is used, the references at the end of the proposal should be listed in alphabetical order.

Possible bias

Bias in the literature or in a review of the literature is a distortion of the available information in such a way that it reflects opinions or conclusions that do not represent the real situation.

It is useful to be aware of various types of bias. This will help you to be critical of the existing literature. If you have reservations about certain references, or if you find conflicting opinions in the literature, discuss these openly and critically. Such a critical attitude may also help you avoid biases in your own study. Common types of bias in literature include:

- Playing down controversies and differences in one's own study results;
- Restricting references to those that support the point of view of the author; and
- Drawing far reaching conclusions from preliminary or shaky research results or making sweeping generalizations from just one case or small study.

Ethical considerations

The types of bias mentioned above would put the **scientific integrity** of the responsible researcher in question. Moreover, careless presentation and interpretation of data may put readers who want to use the study's findings on the wrong track. This may have serious consequences, in terms of time and money spent on HSR and it may even lead to wrong decisions affecting people's health.

A similarly serious act, for which a researcher can be taken to court, is the presentation of research results or scientific publications from other writers **without quoting** the author. Therefore, appropriate referencing procedures should always be followed in research proposals as well as in research reports.

Introduction to group work

For this group work session, you will choose a group chairperson. In the sessions that follow, you will always have a group chairperson as well as a recorder.

The **functions of a chairperson** are to:

- Make sure that all parts of the group work assignment are understood and completed by the group as a whole;
- Take care that all group members have a chance to contribute; (A chairperson should **not** dominate the discussions or always present the results of the group work in plenary sessions.)
- Make sure that tasks are distributed among group members, if required, but that the group as a whole has a chance to discuss the different contributions before they are presented in plenary;
- Take care that 15 minutes before a plenary session is due to begin, flip charts or overhead sheets are prepared for presentation;
- Keep flip charts and other group products together carefully for further use or delegate this task to a group member; and
- Organize and coordinate the typing of various sections of the research report and carefully store the drafts or delegate this task to a group member.

The **functions of the recorder** are to take care that the flip charts or overhead sheets to be presented in plenary:

- Meet the requirements of the group work assignment;
- Contain the main elements of the discussion; and
- Are **clearly written** and **readable** at a distance.

Recorders may change each session, but the leadership role should remain with one group member, for efficiency's sake. This is especially important during the last week, when the final draft of the research proposal is being prepared.

GROUP WORK (2 hours)

1. Select a chairperson and recorder.

2. Outline the topics for which you need information that will be included in the "Review of the literature" for your proposal.

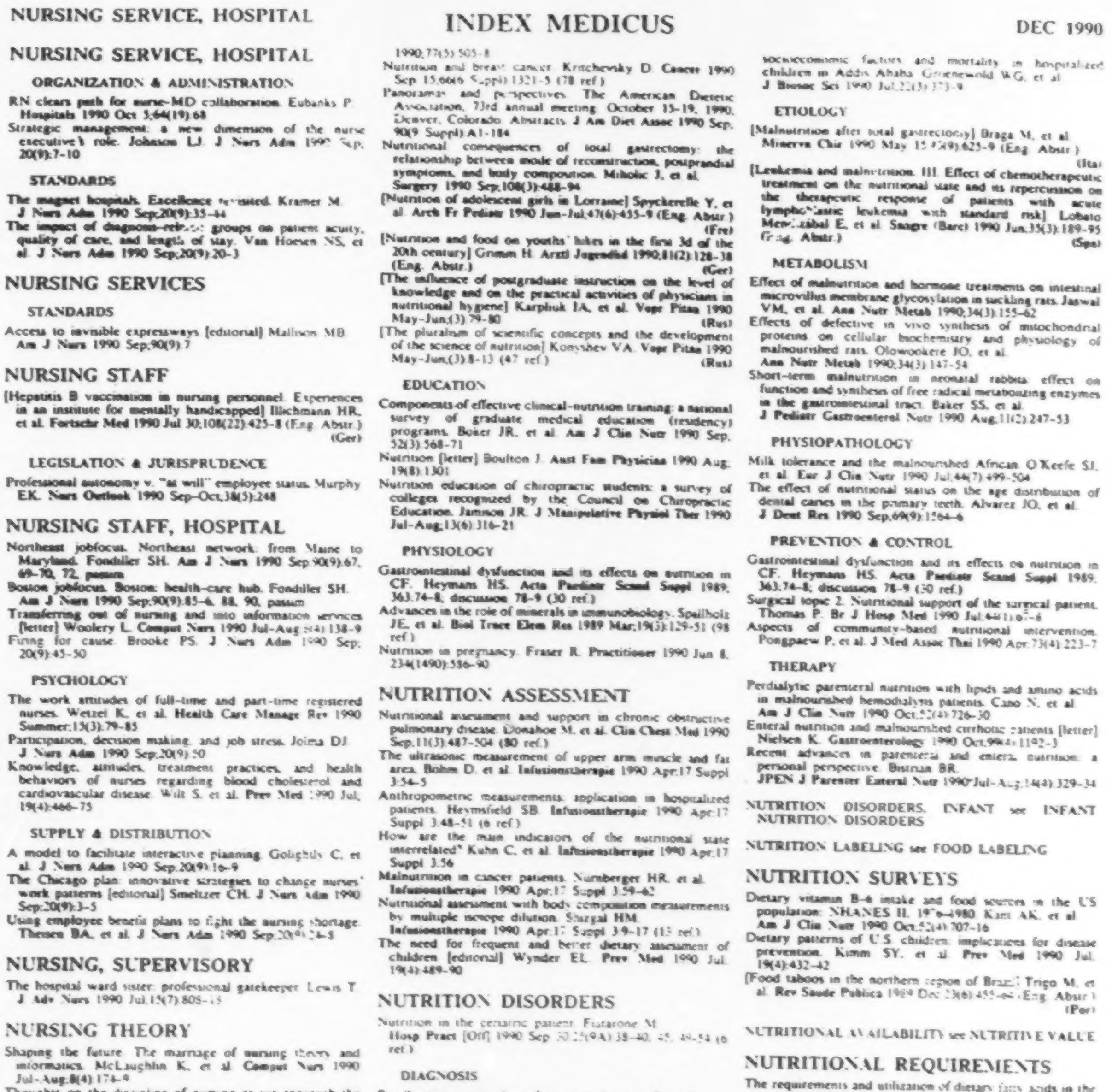
3. List the sources of information you can use for your review (now or later when you return home).

4. Search through the documents (books, articles, and bibliographies) available in the course library. List the most useful references you can find on your topic.

5. Summarize the most important information from the references. Place this information on index cards or in computer entries. (Divide this work among group members.)

6. Prepare a literature review for your proposal. Analyze or critique the contributions from various sources, rather than simply reporting on their content. A list of the references used should be presented as an annex to your research proposal.

Annex 5.1. Sample page from Index Medicus.



NURSING SERVICE, HOSPITAL — INDEX MEDICUS — DEC 1990

NURSING SERVICE, HOSPITAL

ORGANIZATION & ADMINISTRATION

RN clears path for nurse-MD collaboration. Eubanks P. Hospitals 1990 Oct 5;64(19):68

Strategic management: a new dimension of the nurse executive's role. Johnson LJ. J Nurs Adm 1990 Sep;20(9):7-10

STANDARDS

The magnet hospitals. Excellence revisited. Kramer M. J Nurs Adm 1990 Sep;20(9):35-44

The impact of diagnosis-related groups on patient acuity, quality of care, and length of stay. Van Hoesen NS, et al. J Nurs Adm 1990 Sep;20(9):20-3

NURSING SERVICES

STANDARDS

Access to invisible expressways [editorial] Mallison MB. Am J Nurs 1990 Sep;90(9):7

NURSING STAFF

[Hepatitis B vaccination in nursing personnel. Experiences in an institute for mentally handicapped] Illchmann HR, et al. Fortschr Med 1990 Jul 30;108(22):425-8 (Eng. Abstr.) (Ger)

LEGISLATION & JURISPRUDENCE

Professional autonomy v. "at will" employee status. Murphy EK. Nurs Outlook 1990 Sep-Oct;38(5):248

NURSING STAFF, HOSPITAL

Northeast jobfocus. Northeast network: from Maine to Maryland. Fondiller SH. Am J Nurs 1990 Sep;90(9):67, 69-70, 72, passim

Boston jobfocus. Boston: health-care hub. Fondiller SH. Am J Nurs 1990 Sep;90(9):85-6, 88, 90, passim

Transferring out of nursing and into information services [letter] Woolery L. Comput Nurs 1990 Jul-Aug;8(4):138-9

Firing for cause. Brooke PS. J Nurs Adm 1990 Sep;20(9):45-50

PSYCHOLOGY

The work attitudes of full-time and part-time registered nurses. Wetzel K, et al. Health Care Manage Rev 1990 Summer;15(3):79-85

Participation, decision making, and job stress. Jolma DJ. J Nurs Adm 1990 Sep;20(9):50

Knowledge, attitudes, treatment practices, and health behaviors of nurses regarding blood cholesterol and cardiovascular disease. Wilt S, et al. Prev Med 1990 Jul;19(4):466-75

SUPPLY & DISTRIBUTION

A model to facilitate interactive planning. Golightly C, et al. J Nurs Adm 1990 Sep;20(9):16-9

The Chicago plan: innovative strategies to change nurses' work patterns [editorial] Smeltzer CH. J Nurs Adm 1990 Sep;20(9):3-5

Using employee benefit plans to fight the nursing shortage. Theisen BA, et al. J Nurs Adm 1990 Sep;20(9):24-8

NURSING, SUPERVISORY

The hospital ward sister: professional gatekeeper. Lewis T. J Adv Nurs 1990 Jul;15(7):808-15

NURSING THEORY

Shaping the future. The marriage of nursing theory and informatics. McLaughlin K, et al. Comput Nurs 1990 Jul-Aug;8(4):174-9

Thoughts on the discipline of nursing as we approach the year 2000. Moore S. J Adv Nurs 1990 Jul;15(7):825-8

1990;77(5):505-8

Nutrition and breast cancer. Kritchevsky D. Cancer 1990 Sep 15;66(6 Suppl):1321-5 (78 ref.)

Panoramas and perspectives. The American Dietetic Association, 73rd annual meeting. October 15-19, 1990, Denver, Colorado. Abstracts. J Am Diet Assoc 1990 Sep;90(9 Suppl):A1-184

Nutritional consequences of total gastrectomy: the relationship between mode of reconstruction, postprandial symptoms, and body composition. Miholic J, et al. Surgery 1990 Sep;108(3):488-94

[Nutrition of adolescent girls in Lorraine] Spyckerelle Y, et al. Arch Fr Pediatr 1990 Jun-Jul;47(6):455-9 (Eng. Abstr.) (Fre)

[Nutrition and food on youths' hikes in the first 3d of the 20th century] Grimm H. Arztl Jugendkd 1990;81(2):128-38 (Eng. Abstr.) (Ger)

[The influence of postgraduate instruction on the level of knowledge and on the practical activities of physicians in nutritional hygiene] Karpliuk IA, et al. Vopr Pitan 1990 May-Jun;(3):79-80 (Rus)

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EDUCATION

Components of effective clinical-nutrition training: a national survey of graduate medical education (residency) programs. Boker JR, et al. Am J Clin Nutr 1990 Sep;52(3):568-71

Nutrition [letter] Boulton J. Aust Fam Physician 1990 Aug;19(8):1301

Nutrition education of chiropractic students: a survey of colleges recognized by the Council on Chiropractic Education. Jamison JR. J Manipulative Physiol Ther 1990 Jul-Aug;13(6):316-21

PHYSIOLOGY

Gastrointestinal dysfunction and its effects on nutrition in CF. Heymans HS. Acta Paediatr Scand Suppl 1989;363:74-8; discussion 78-9 (30 ref.)

Advances in the role of minerals in immunobiology. Spallholz JE, et al. Biol Trace Elem Res 1989 Mar;19(3):129-51 (98 ref.)

Nutrition in pregnancy. Fraser R. Practitioner 1990 Jun 8;234(1490):536-90

NUTRITION ASSESSMENT

Nutritional assessment and support in chronic obstructive pulmonary disease. Donahoe M, et al. Clin Chest Med 1990 Sep;11(3):487-504 (80 ref.)

The ultrasonic measurement of upper arm muscle and fat area. Bohm D, et al. Infusionstherapie 1990 Apr;17 Suppl 3:54-5

Anthropometric measurements: application in hospitalized patients. Heymsfield SB. Infusionstherapie 1990 Apr;17 Suppl 3:48-51 (6 ref.)

How are the main indicators of the nutritional state interrelated? Kuhn C, et al. Infusionstherapie 1990 Apr;17 Suppl 3:56

Malnutrition in cancer patients. Nurnberger HR, et al. Infusionstherapie 1990 Apr;17 Suppl 3:59-62

Nutritional assessment with body composition measurements by multiple isotope dilution. Shizgal HM. Infusionstherapie 1990 Apr;17 Suppl 3:9-17 (13 ref.)

The need for frequent and better dietary assessment of children [editorial] Wynder EL. Prev Med 1990 Jul;19(4):489-90

NUTRITION DISORDERS

Nutrition in the geriatric patient. Fiatarone M. Hosp Pract [Off] 1990 Sep 30;25(9A):38-40, 45, 49-54 (6 ref.)

DIAGNOSIS

Prealbumin as a marker of nutritional status. Brose L. J Burn Care Rehabil 1990 Jul-Aug;11(4):372-5

socioeconomic factors and mortality in hospitalized children in Addis Ababa. Groenewold WG, et al. J Biosoc Sci 1990 Jul;22(3):373-9

ETIOLOGY

[Malnutrition after total gastrectomy] Braga M, et al. Minerva Chir 1990 May 15;45(9):625-9 (Eng. Abstr.) (Ita)

[Leukemia and malnutrition. III. Effect of chemotherapeutic treatment on the nutritional state and its repercussion on the therapeutic response of patients with acute lymphoblastic leukemia with standard risk] Lobato Mendizabal E, et al. Sangre (Barc) 1990 Jun;35(3):189-95 (Eng. Abstr.) (Spa)

METABOLISM

Effect of malnutrition and hormone treatments on intestinal microvillus membrane glycosylation in suckling rats. Jaswal VM, et al. Ann Nutr Metab 1990;34(3):155-62

Effects of defective in vivo synthesis of mitochondrial proteins on cellular biochemistry and physiology of malnourished rats. Olowookere JO, et al. Ann Nutr Metab 1990;34(3):147-54

Short-term malnutrition in neonatal rabbits: effect on function and synthesis of free radical metabolizing enzymes in the gastrointestinal tract. Baker SS, et al. J Pediatr Gastroenterol Nutr 1990 Aug;11(2):247-53

PHYSIOPATHOLOGY

Milk tolerance and the malnourished African. O'Keefe SJ, et al. Eur J Clin Nutr 1990 Jul;44(7):499-504

The effect of nutritional status on the age distribution of dental caries in the primary teeth. Alvarez JO, et al. J Dent Res 1990 Sep;69(9):1564-6

PREVENTION & CONTROL

Gastrointestinal dysfunction and its effects on nutrition in CF. Heymans HS. Acta Paediatr Scand Suppl 1989;363:74-8; discussion 78-9 (30 ref.)

Surgical topic 2. Nutritional support of the surgical patient. Thomas P. Br J Hosp Med 1990 Jul;44(1):67-8

Aspects of community-based nutritional intervention. Pongpaew P, et al. J Med Assoc Thai 1990 Apr;73(4):223-7

THERAPY

Perdialytic parenteral nutrition with lipids and amino acids in malnourished hemodialysis patients. Cano N, et al. Am J Clin Nutr 1990 Oct;52(4):726-30

Enteral nutrition and malnourished cirrhotic patients [letter] Nielsen K. Gastroenterology 1990 Oct;99(4):1192-3

Recent advances in parenteral and enteral nutrition: a personal perspective. Bistrian BR. JPEN J Parenter Enteral Nutr 1990 Jul-Aug;14(4):329-34

NUTRITION DISORDERS, INFANT see INFANT NUTRITION DISORDERS

NUTRITION LABELING see FOOD LABELING

NUTRITION SURVEYS

Dietary vitamin B-6 intake and food sources in the US population: NHANES II, 1976-1980. Kant AK, et al. Am J Clin Nutr 1990 Oct;52(4):707-16

Dietary patterns of U.S. children: implications for disease prevention. Kimm SY, et al. Prev Med 1990 Jul;19(4):432-42

[Food taboos in the northern region of Brazil] Trigo M, et al. Rev Saude Publica 1989 Dec;23(6):455-64 (Eng. Abstr.) (Por)

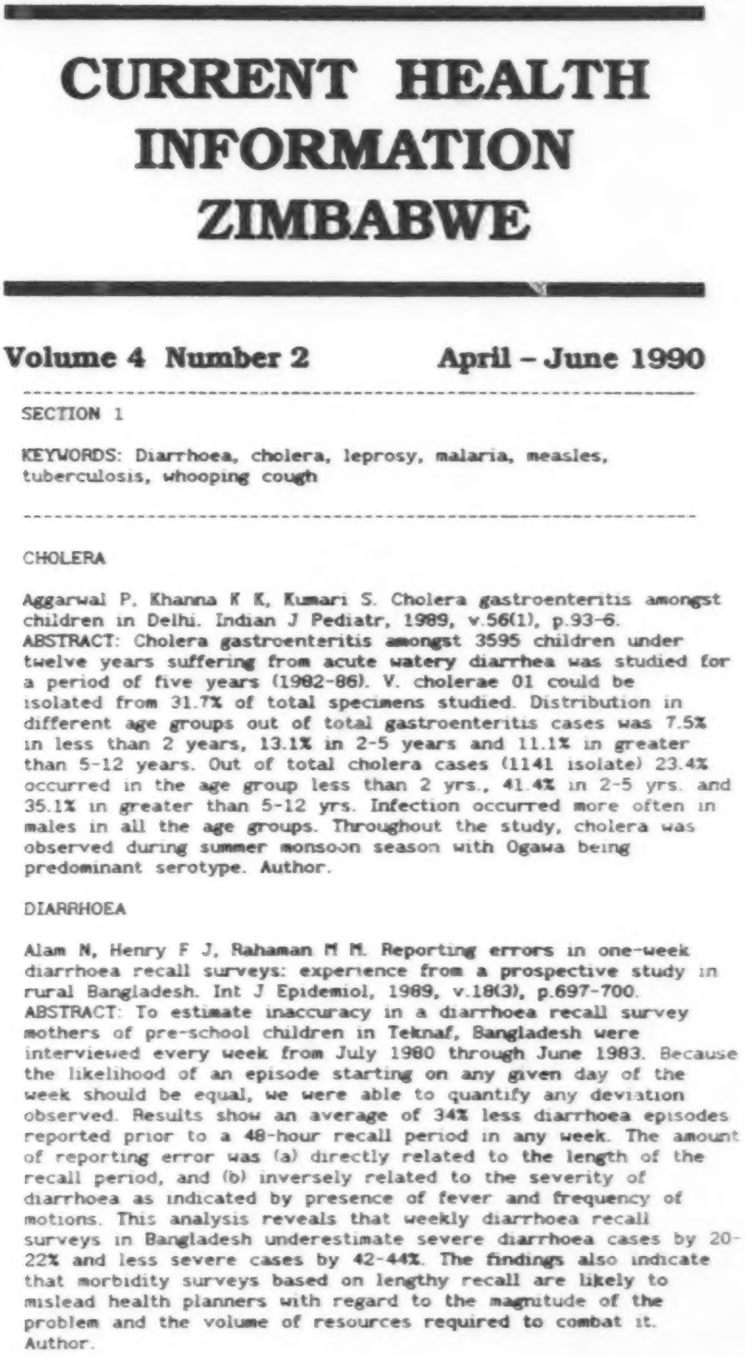
NUTRITIONAL AVAILABILITY see NUTRITIVE VALUE

NUTRITIONAL REQUIREMENTS

The requirements and utilization of dietary fatty acids in the newborn infant. Hernell O. Acta Paediatr Scand Suppl 1990;365:20-7

Guidelines for refeeding the marasmic patient. Apovian CM, et al. Crit Care Med 1990 Sep;18(9):1030-3

Annex 5.2. Sample page from an abstract journal.



CURRENT HEALTH INFORMATION ZIMBABWE

Volume 4 Number 2 **April – June 1990**

SECTION 1

KEYWORDS: Diarrhoea, cholera, leprosy, malaria, measles, tuberculosis, whooping cough

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CHOLERA

Aggarwal P, Khanna K K, Kumari S. Cholera gastroenteritis amongst children in Delhi. Indian J Pediatr, 1989, v.56(1), p.93-6.
ABSTRACT: Cholera gastroenteritis amongst 3595 children under twelve years suffering from acute watery diarrhea was studied for a period of five years (1982-86). V. cholerae 01 could be isolated from 31.7% of total specimens studied. Distribution in different age groups out of total gastroenteritis cases was 7.5% in less than 2 years, 13.1% in 2-5 years and 11.1% in greater than 5-12 years. Out of total cholera cases (1141 isolate) 23.4% occurred in the age group less than 2 yrs., 41.4% in 2-5 yrs. and 35.1% in greater than 5-12 yrs. Infection occurred more often in males in all the age groups. Throughout the study, cholera was observed during summer monsoon season with Ogawa being predominant serotype. Author.

DIARRHOEA

Alam N, Henry F J, Rahaman M M. Reporting errors in one-week diarrhoea recall surveys: experience from a prospective study in rural Bangladesh. Int J Epidemiol, 1989, v.18(3), p.697-700.
ABSTRACT: To estimate inaccuracy in a diarrhoea recall survey mothers of pre-school children in Teknaf, Bangladesh were interviewed every week from July 1980 through June 1983. Because the likelihood of an episode starting on any given day of the week should be equal, we were able to quantify any deviation observed. Results show an average of 34% less diarrhoea episodes reported prior to a 48-hour recall period in any week. The amount of reporting error was (a) directly related to the length of the recall period, and (b) inversely related to the severity of diarrhoea as indicated by presence of fever and frequency of motions. This analysis reveals that weekly diarrhoea recall surveys in Bangladesh underestimate severe diarrhoea cases by 20-22% and less severe cases by 42-44%. The findings also indicate that morbidity surveys based on lengthy recall are likely to mislead health planners with regard to the magnitude of the problem and the volume of resources required to combat it. Author.

Annex 5.3. Example of output from a computerized literature search.

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DATASTAR          MEDX: MEDLINE AUG. 90/2 (900615-900628)          13.07.
QUERY 0218                                                         PAGE
COPYRIGHT BY NATIONAL LIBRARY OF MEDICINE (NLM)

-----------------------------------------------------------------    1

AU Kiesler-C-A, Simpkins-C, Horton-T.
TI The  psychiatric inpatient treatment of children and youth in gener
   hospitals.
SO Am-J-Community-Psychol  1989  Dec,  VOL:  17  (6),  P:  821-30, ISS
   0091-0562.
AB National  attention  has  recently focused on the mental health nee
   and  services  of children and youth. The lack of outpatient servic
   and  their coordination  has  been  noted, as well as the conseque
   press  towards inpatient care. We describe the inpatient treatment
   children  and  adolescents  (ages  0-18)  in  short-term, non-Feder
   general  hospitals in 1980. Nationally, 128,300 children were treat
   for  mental  disorders  in  general hospitals at an estimated cost
   over  $1.5  billion. Compared to adults, children were more likely
   be treated in scatter beds (vs. specialty units); have a diagnosis
   mental  disorder  (vs.  alcohol/drug disorder); stay much longer; a
   pay  with commercial insurance. Previous work focusing on psychiatr
   units  of  general  hospitals  identified  less than 40% of the tot
   episodes,  a  figure very similar to that for adults. The majority
   psychiatric  inpatient  episodes for children and youth in the Unit
   States  takes  place  in  short-term  general  hospitals.  Communi
   psychologists  need  to be aware of national trends in inpatient ca
   and  be  involved  in the development and promulgation of alternati
   models of care. Author.
-----------------------------------------------------------------    2

AU Schurch-E-Jr, Minder-C-E, Lang-N-P, Geering-A-H.
TI Comparison  of  clinical  periodontal  parameters  with the Communi
   Periodontal Index for Treatment Needs (CPITN) data.
SO Schweiz-Monatsschr-Zahnmed  1990,  VOL:  100  (4),  P:  408-11, ISS
   1011-4203.
AB The  purpose  of this analysis was to assess the ability of the CPI
   system  to  rate severity and prevalence of periodontal diseases in
   population, in comparison with full mouth scorings using convention
   clinical  parameters  (Plaque Index, Gingival Index, Retention Inde
   Pocket  Probing  Depth and Loss of Attachment). These parameters we
   collected in a randomly selected sample in Switzerland. The data we
   then  transformed to fit the definitions of the CPITN. Furthermore,
   comparison  of  the data set from Switzerland with data obtained fr
   the  Oral  Global Data Bank of the WHO was made. By conversion of t
   Swiss  data into the CPITN format, many details were lost, which we
   considered  to  be  relevant  to  assess  severity,  prevalence  a
   localization  of  periodontal  diseases  within  a  population.
   addition, the transformed data generally overestimated the prevalen
   of  periodontal  destruction  when compared with data from surveys
   other  industrialized  countries  in  which  the  CPITN  was  used
   evaluate  the  periodontal  status. The comparison of the data befo
   transformation  into  the  CPITN,  however, corroborated results fr
   epidemiological  studies  in  which  conventional  periodontal  ind
   systems  were  used.  This  indicates that data obtained to determi
   defined  treatment needs (CPITN) may be of questionable value for t
   assessment of the true prevalence and severity of periodontal disea
   in a population. Author.
```

Annex 5.4. Example of a reference recorded on an index card.

Hassouna WA. Solving people's problems. World Health, 1980; April: 26-29.

- This article discusses health services research (HSR) as a relatively new area of investigation (1960).
- This method of research permits the health team and the community to study critical problems, while economizing on time and money. Important to try to collaborate with service administrators.
- If HSR is to be effective, must be done so results available in time to solve problems it addresses -- change in health status, not publication, most important result of research.
- Example of HSR study in Maruit (Egypt):
    - In 2 days a multidisciplinary team (25 members) was able to identify the critical problems affecting health and health care in area.
    - Various aspects of the study are discussed.
    - The study results are stated clearly and the role of the traditional healer identified.
    - Among major findings was that "the formal providers of health services were not giving the people the service they required at the time they needed it, at a cost they could pay, and in a manner acceptable to the people." (p. 27)

The reverse side of the index card appears below:

- Points that are emphasized in the article:
    - There's little correlation between size and quality of health services available to population and health status of population (p. 28). Problem is present nature of medical technology.
    - Use of med. technology to improve health status would be more successful if became integral part of socio-cultural and ec. behavioural change process. (p. 28)
    - Article lists characteristics and advantages of PHC and role of community in it.
    - Discusses importance of HSR related to PHC - conviction HSR should form core of WHO "Health for All by the Year 2000" strategy.
    - Important to involve WHO staff in field activities so acquire practical understanding of health service realities.
- Observations:

    Good reference article on applied research, PHC, and research training.

Annex 5.5. Sample references.

1. Taylor CE. The uses of health systems research. Geneva: WHO, 1984. Public Health Papers 78.

2. Illsley R. Introduction to HSR. In: Health systems research in action. Programme on Health Systems Research and Development. Geneva: WHO, 1988.

3. Bryant Y. Health and the developing world. Ithaca: Cornell University Press, 1969.

4. Health Systems Research Advisory Group. First Meeting, Geneva, 7-10 April 1986. Report and Working Document. Geneva: WHO, 1986.

5. Foster GM, Anderson GE. Medical anthropology. New York: John Wiley and Sons, 1978.

6. Kleinman A. Concepts and a model for the comparison of medical systems as cultural systems. Social Science and Medicine, 1978; 12: 85-93.

7. White KL, Henderson MM (eds.). Epidemiology as a fundamental science: its uses in health services planning, administration and evaluation. New York: Oxford University Press, 1976.

8. Knox EG (ed.). Epidemiology in health care planning. New York: Oxford University Press, 1979.

9. Kwofie K. The process of introducing nutrition objectives into rural and agricultural development: lessons from the Baringo experiment. Lusaka, Kenya: National Food and Nutrition Commission, 1979.

10. Yambi O. Nutritional problems and policies in Tanzania. Ithaca, NY: Cornell Institute, 1980. Monograph no. 7.

11. Gish O, Walker G. Mobile health services. London: Tri-Med Bodus Ltd, 1977.

Module 5: REVIEW OF AVAILABLE LITERATURE AND INFORMATION

Timing and teaching methods

½ hour	Introduction and discussion
3 hours	Group work
3½ hours	TOTAL TIME

Materials

- Examples of:
  - Abstract journal,
  - *Index Medicus*,
  - Index card
  - Computer printout,
  - Reference list.

(You can use copies in Annexes 5.1-5.5, or supply your own examples.)

- Two blank index cards or blank sheets of paper for each participant.

Be sure that the course library is ready for use. Prior to this session, facilitators should also look through their own resources to find any relevant articles they may have for each research topic.

Introduction and discussion

Discuss why and how to do a review of the literature. Have participants suggest answers to the questions, but provide additional information when necessary.

- Refer to the Annexes for examples of tools that can be used to find information relevant to a specific research topic.
- It may be useful to have the assistance of a librarian in this session.
- Provide information on national library facilities that may be available during or after the course.
- Stress the importance of developing libraries at all management levels in organizations and ministries concerned with solving health problems.

Present the points concerning preparation and use of index cards or computer entries.

Discuss possible biases in documents and literature review. Stress the researcher's responsibility for presenting his or her findings honestly so that readers who want to implement the findings are not put on the wrong track.

Ask for comments or questions concerning the review of the literature and problems participants are likely to face. Determine how you can help the participants overcome these problems.

Group work

Ask the group to begin a review of literature and information relevant to the proposal that they may complete when they return home. If possible, try to obtain relevant papers and reports from various sources for use during the course.

As a first step, each participant should review at least two articles, reports, or books on index cards or blank sheets of paper.

Then the information should be put together in a review of 1-2 pages. **Make sure that references are cited correctly**, preferably by numbering them in the text and preparing a reference list using the same numbers.

Emphasize that the review of the literature should be thorough and critical. However, only references that relate directly to the proposed research should be cited and discussed. Irrelevant literature should **not** be mentioned.

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 6:

FORMULATION OF RESEARCH OBJECTIVES

Steps in the development of an HSR proposal

Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 6: FORMULATION OF RESEARCH OBJECTIVES

OBJECTIVES

At the end of this session you should be able to:

1. **State** the reasons for writing objectives for your research project.
2. **Define** and describe the difference between general and specific objectives.
3. **Define** the characteristics of research objectives.
4. **Prepare** research objectives in an appropriate format for the project you are developing.

Research objectives

The **objectives** of a research project summarize what is to be achieved by the study.

Objectives should be closely related to the statement of the problem. For example, if the problem identified is low utilization of child welfare clinics, the general objective of the study could be to identify the reasons for this low utilization, to find solutions.

The **general objective** of a study states what is expected to be achieved by the study in general terms.

It is possible (and advisable) to break down a general objective into smaller, logically connected parts. These are normally referred to as **specific objectives.**

Specific objectives should systematically address the various aspects of the problem as defined under "Statement of the problem" (Module 4) and the key factors that are assumed to influence or cause the problem. They should specify **what** you will do in your study, **where,** and **for what purpose**.

The general objective "to identify the reasons for low utilization of child welfare clinics in District X to find solutions," for example, could be broken down into the following specific objectives:

1. Determine the level of utilization of the child welfare clinics in District X, over the years 1988 and 1989, as compared with the target set.

2. Identify whether there are variations in utilization of child welfare clinics, related to the season, type of clinic, and type of children served.

3. Identify factors related to the child welfare services offered that make them either attractive or not attractive to mothers. This objective may be divided into smaller subobjectives focusing on distance between the home and clinic, acceptability of the services to mothers, quality of the services, etc.

4. Identify socioeconomic and cultural factors that may influence the mothers' utilization of services. (Again, this objective may be broken down into several subobjectives.)

5. Make recommendations to all parties concerned (managers, health staff, and mothers) concerning what changes should be made, and how, to improve the use of child welfare clinics.

6. Work with all parties concerned to develop a plan for implementing the recommendations.

The first objective focuses on quantifying the problem. This is necessary in many studies. Often use can be made of available statistics or of the health information system.

Objective 2 further specifies the problem, looking at its distribution. Objectives 3 and 4 examine possible factors that may influence the problem, and objectives 5 and 6 indicate how the results will be used.

Note:

An objective focusing on **how the results will be used** should be included in every applied research study.

Why should research objectives be developed?

The formulation of objectives will help you to:

- **Focus** the study (narrowing it down to essentials);
- **Avoid** collection of data that are not strictly necessary for understanding and solving the problem you have identified; and
- **Organize** the study in clearly defined parts or phases.

Properly formulated, specific objectives will facilitate the development of your research methodology and will help to orient the collection, analysis, interpretation, and utilization of data.

How should you state your objectives?

Take care that the objectives of your study:

- Cover the different aspects of the problem and its contributing factors in a **coherent** way and in a **logical sequence**;
- Are **clearly phrased** in **operational terms,** specifying exactly what you are going to do, where, and for what purpose;
- Are **realistic** considering local conditions; and
- Use **action verbs** that are specific enough to be evaluated.

  Examples of action verbs are: to determine, to compare, to verify, to calculate, to describe, and to establish.

  Avoid the use of vague nonaction verbs such as: to appreciate, to understand, or to study.

Keep in mind that when the project is evaluated, the results will be compared to the objectives. If the objectives have not been spelled out clearly, the project cannot be evaluated.

Using the previous example on utilization of child welfare clinics, we may develop more specific objectives such as:

- **To compare** the level of utilization of the child welfare clinic services among various socioeconomic groups;
- **To establish** the pattern of utilization of child welfare clinic services in various seasons of the year;
- **To verify** whether increasing distance between the home and the health facility reduces the level of utilization of the child welfare clinic services;
- **To describe** mothers' perceptions of the quality of services provided at the child welfare clinics.

Hypotheses

Based on your experience with the study problem, it might be possible to develop explanations for the problem that can then be tested. If so, you can formulate hypotheses in addition to the study objectives.

A HYPOTHESIS is a prediction of a relationship between one or more factors and the problem under study, which can be tested.

In our example concerning the low utilization of child welfare clinics, it would be possible to formulate and test the following hypotheses:

1. Utilization of child welfare clinics is lowest in the rainy season due to the high workload of mothers during that period.
2. Utilization of child welfare clinics is lowest in those clinics in which staff are poorly motivated to provide preventive services.

Note:

Policymakers and field staff usually feel the need for research because they do **NOT** have enough insight into the causes of a certain problem. Therefore, most HSR proposals present the specific objectives in the form of **open statements** (as given in the examples earlier) instead of focusing the study on a limited number of hypotheses.

Title of the study

Now, you can finalize the title of your study. The title should be in line with your general objective. Make sure that it is specific enough to tell the reader what your study is about.

NOT: "A study of utilization of child welfare clinics"

BUT: "A study of the reasons for low utilization of child welfare clinics in District X"

You might also consider fancier titles:

> "WORKSHOPS: blessings or burdens?
>
> A study of the workshops held in 1990 in Province Y - their utility and consequences for daily working activities"

GROUP WORK (2 hours)

1. Choose a chairperson and a recorder.

2. Hang up the flip charts that you used to present your statement of the problem so they are visible to all group members. Incorporate useful suggestions for changes that were made when you presented them in plenary. Then, use the analysis diagram as a starting point for formulating objectives, focusing, for example, on:

   - Further quantifying and specifying the problem, if required;
   - Exploring the key factors or major groups of factors that, in your opinion, might influence or cause the problem; and
   - Any other major research activities you propose.

3. Prepare a general objective and specific objectives for the research proposal you are developing.

4. After formulating your objectives ask yourself the following questions:

   - Do the objectives deal with all aspects of the research problem in a logical and coherent way?
   - Are the objectives clearly phrased?
   - Are the objectives defined in operational terms that can be measured? Realistic?
   - Do they indicate where the study will be conducted?
   - Do they include the development of recommendations for how the research results will be used to solve the problem?

5. Prepare a flip chart with your objectives for use in the **Exercise** and in the plenary discussion. Add on the title of your study and revise it, if necessary, to match the objectives.

EXERCISE: Assessing the objectives of another group (1/2 hour)

Assess the research objectives formulated by another team using the criteria mentioned above. Compare them with the group's statement of the problem and the title of the study.

Module 6: FORMULATION OF RESEARCH OBJECTIVES

Timing and teaching methods

½ hour	Introduction and discussion
2 hours	Group work
½ hour	Exercise: Assessing the objectives of another group
1 hour	Presentation by each group, followed by comments by the group that did the exercise and general discussion
1 hour	Adjustments
5 hours	TOTAL TIME

Introduction and discussion

- Emphasize that the formulation of clear and comprehensive objectives is critical to the development of all the other components of a research design, as well as to subsequent data analysis and report writing.

- Formulation of good objectives is a skill with which many participants have difficulty. Two types of problems come up quite often:

  - Difficulties with developing concise, measurable objectives that focus clearly on what the study hopes to accomplish and cover all parts of the study in a logical order;
  - Difficulties in understanding the difference between program objectives and research objectives. For example, many participants may not, in the beginning, see the distinction between a program objective, such as, "Make sure that health posts in District X are supplied monthly with sufficient drugs," and a research objective, such as "To compare two methods of supplying drugs to health posts in District X."

  Reference to the analysis diagram that groups developed in **Module 4** will help solve these problems. It should be stressed that they should first consider whether they need more data to specify their problem. Then they should systematically write objectives to cover the different categories of factors they have identified.

- Stress that it is not necessary to develop an objective for every single contributing factor they included in the diagram. The participants should try to limit their objectives to two or three for each major category in their diagram, including several factors in each objective, when possible.

Group work

Be sure to provide sufficient time for the groups to formulate good objectives for their chosen projects. As groups work from their analysis diagram, they may discover that changes are necessary (additions, regrouping, or dropping of factors). It is recommended that the diagram be displayed on a flip chart rather than on an overhead sheet with photocopies for individual group members, so it will be easier to focus the group's attention on it. The flip chart with the diagram can also be used in Module 8 (Variables).

EXERCISE: Assessing the objectives of another group

Hold an exercise in which groups evaluate the objectives prepared by another group, using the criteria set out on the exercise sheet.

Plenary session

Have each group present their analysis diagram and the objectives they have developed. Immediately following each presentation ask the group that analyzed the objectives during the exercise to comment and then open up the discussion to the rest of the class. (Allow 15 minutes per topic.)

Each group should also present the title of their research project which they have adjusted to match their study objectives.

It is important that each group receive clear feedback on the quality of the objectives they have developed, as well as practical suggestions for improvement. When providing feedback, ask yourself:

1. Do the objectives cover all parts of the analysis diagram, in a logical order?
2. Do the objectives really measure what the group wants them to?
3. If the objectives were met, would the study provide the results needed to solve the problem posed in the statement of the problem?
4. Are the objectives too ambitious? If so, could the scope of the study be reduced?
5. Is the title specific enough and does it cover the objectives?

Adjustments

Facilitators in past courses have found it useful to provide a second group work session in which participants can finalize their objectives, analysis diagram, and title of the research project, after they have received feedback during the plenary session.

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 7:

INTRODUCTION TO HEALTH SYSTEMS RESEARCH METHODOLOGY

Steps in the development of an HSR proposal

Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	

N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 7: INTRODUCTION TO HEALTH SYSTEMS RESEARCH METHODOLOGY

OBJECTIVES

At the end of this session, you should be able to:

1. **Identify** the pertinent questions to consider when developing the methodology for your research proposal.

2. **Describe** the components that should be dealt with in the methodology section of your research proposal.

In previous modules, you:

- Selected a research topic;
- Prepared a brief description of the problem and its importance;
- Conducted a literature and information review to determine what was already known about the problem; and
- Developed objectives which clearly state the purpose of the study, what study results are expected, and how the results will be used.

Now you must decide exactly how you are going to achieve your stated objectives, i.e., what new data you need to shed light on the problem you have selected and how you are going to collect and process this data. The questions in the flow chart on the next page cover the major issues that must be examined as you develop your research design. These issues will be dealt with in the modules that follow.

Health systems research methodology

Questions you should ask	Components of research design
1. What new information do we need?	Selection of variables (Module 8)
2. How will we collect this information?	Selection of type of study (Module 9)
3. What tools do we need to collect it?	Selection of data collection techniques (Modules 10A, 10B, 10C, 10D)
4. Where should we collect it? How many subjects do we include in the study and how do we select them?	Sampling (Module 11)
5. How do we collect the data?	Plan for data collection (Module 12)
6. What will we do with the collected data?	Plan for data processing and analysis (Module 13)
7. Are we likely to harm anyone as a result of the study?	Ethical considerations (discussed in various modules)
8. How can we determine whether our methods for data collection are correct before implementing the study?	Pretesting the methodology (Module 14)

Note: The steps are interrelated. The process is often cyclical in nature. After completing a step, it is useful to review previous steps to ensure consistency in your proposal.

Module 7: INTRODUCTION TO HEALTH SYSTEMS RESEARCH METHODOLOGY

Timing and teaching methods

15 min.	Introduction and discussion
15 min.	TOTAL TIME

Guidelines for trainers

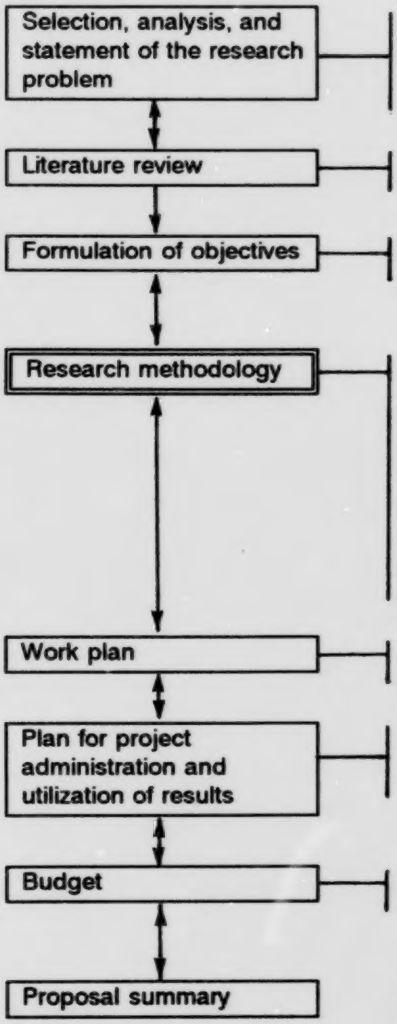
- List and explain the components of a good research design as outlined in the module.
- Stress the cyclical nature of the different steps in designing the methodology.

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 8:

VARIABLES

Steps in the development of an HSR proposal



Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	

N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 8: VARIABLES

OBJECTIVES

At the end of this session, you should be able to:

1. **Define** what variables are and describe why their selection is important in research.
2. **State** the difference between numerical and categorical variables.
3. **Discuss** the difference between dependent and independent variables and how they are used in research designs.
4. **Identify** the variables that will be measured in the research project you are designing and develop operational definitions with indicators for those variables that cannot be measured directly.
5. **List** the variables that you hope to identify and describe during your planned study, but that cannot be measured at this time.

Introduction

In **Module 4**, we analyzed the problem we want to investigate. The problem itself and all the factors that might influence it were presented in a diagram, which then served as the basis for the formulation of research objectives. Now we have come to a stage where we must ask ourselves the question:

"**What information are we going to collect** in our study to meet our objectives?"

- In most studies, we must first describe the problem itself more precisely.

  For example, in a study that is investigating why so many tuberculosis (TB) patients default from out-patient treatment, we first want to know how high the defaulter rate is: is it 10%, 30%, 50%? To obtain the defaulter rate we need a clear definition of what we mean by defaulting (how many times treatment was missed).

- We also want to know **whether** certain factors indeed influence the problem, and **to what extent**. If we know the extent to which a certain factor influences the problem, we are much more likely to be able to convince ourselves and others to take action.

  For example, if we find that becoming a TB treatment defaulter is strongly associated with:

  - Lack of knowledge concerning the actual duration of treatment and the danger of relapse or death when the full course is not completed;
  - Living more than 8 km away from the clinic where the drugs have to be obtained each month: and
  - Being between 15 and 30 years of age,

  we have clues which will help us to solve the problem.

Thus, it is essential that the problem itself, as well as each of the factors we identified when analyzing the problem in **Module 4**, is carefully defined. To do this we must select variables.

What is a variable?

A VARIABLE is a characteristic of a person, object, or phenomenon that can take on different values.

A simple example of a variable is a person's age. The variable age can take on different values because a person can be 20 years old, 35 years old, and so on. Other examples of variables are:

- Weight (expressed in kilograms or in pounds);
- Distance between homes and clinic (expressed in kilometres or in minutes walking distance); and
- Monthly income (expressed in dollars, rupees, or kwachas).

Because the values of all these variables are expressed in numbers, we call them NUMERICAL VARIABLES.

The different values of a variable may also be expressed in **categories**. For example, the variable sex has two values, male and female, which are distinct categories. Other examples are:

Table 8.1. Examples of categorical variables.

Variables	Categories
Colour	• red • blue • green, etc.
Outcome of disease	• recovery • chronic illness • death
Main type of staple food eaten	• maize • millet • rice • cassava, etc.

Since the values of these variables are expressed in categories, we call them CATEGORICAL VARIABLES.

Factors rephrased as variables

When looking at your analysis diagram you will notice that most of what we called "factors" (for convenience sake) are in fact variables which have negative values. As we conduct our study and try to determine **to what extent** these variables play a role, we have to formulate the variables in a neutral way, so that they can take on positive as well as negative values. The table below presents examples of negative "factors" and how they can be rephrased as "variables".

Table 8.2: Factors rephrased as variables

Factors as presented in the analysis diagram	Variables
• Long waiting time • Absence of drugs • Lack of supervision • Poor knowledge of the signs, causes, and consequences of TB	• Waiting time • Availability of drugs • Frequency of supervisory visits • Knowledge of the signs, causes, and consequences of TB

Operationalizing variables by choosing appropriate indicators

Note that the different values of many of the variables presented up to now can easily be determined. However, for some variables it is sometimes not possible to find meaningful categories unless the variables are made operational with one or more precise **INDICATORS**. Operationalizing variables means making them "measurable."

For example:

- In many HSR studies, you want to determine the level of knowledge concerning a specific issue. This will assist you in determining to what extent the factor "poor knowledge" influences the problem under study, for example low utilization of prenatal care by pregnant women.

  The variable "level of knowledge" cannot be measured as such. You must develop a series of questions to assess a person's knowledge, for example on prenatal care and risk factors related to pregnancy. The answers to these questions form an **indicator** of the person's knowledge on this issue that can now be categorized. If 10 questions were asked, you may decide that the knowledge of those with:

  - 0 to 3 correct answers is poor,
  - 4 to 6 correct answers is reasonable, and
  - 7 to 10 correct answers is good.

- Nutritional status of under-5 year olds is another example of a variable that cannot be measured directly and for which you would need to choose appropriate indicators. Widely used indicators for nutritional status include:

  - Weight in relation to age,
  - Weight in relation to height,
  - Height in relation to age, and
  - Upper-arm circumference.

  For classification of nutritional status, internationally accepted categories already exist, based on so-called standard growth curves. For the indicator "weight/age," for example, children are:

  - Well nourished if they are above 80% of the standard,
  - Moderately malnourished if they are between 60% and 80%, and
  - Severely malnourished if they are below 60%.

See **Annex 8.1** for examples of variables and indicators that operationalize variables.

Note
When defining variables on the basis of the problem analysis diagram, it is important to realize which variables are measurable as such and which ones need indicators. Once appropriate indicators have been identified, we know exactly what information we are looking for. This makes the collection of data as well as the analysis more focused and efficient.

Defining variables and indicators of variables

To ensure that everyone (the researcher, the data collectors, and, eventually, the reader of the research report) understands exactly what has been measured and to ensure that there will be consistency in the measurement, it is necessary to clearly define the variables (and indicators of variables). **For example**, to define the indicator "waiting time" it is necessary to decide what will be considered the starting point of the waiting period, e.g., is it when the patient enters the front door, or when he or she has been registered and obtained a card?

Examples of different possibilities when defining commonly used variables and indicators are given in **Annex 8.2.**

For certain variables, it may not be possible to define adequately the variable or the indicator immediately because further information may be needed for this purpose. Researchers may need to review the literature to find out what definitions have been used by other researchers, so that they can standardize their definitions and thus be able later to easily compare their findings with those of the other studies. In some cases, the opinions of "experts" or community members or health-care providers may be needed to define the variable or indicator.

> **For example**, in a study of referrals made by health centres to a large hospital, one variable that may be studied is the adequacy of the information that is provided to the hospital by the staff of the health centre. To define the "items of information that should be included" and the criteria for determining "adequacy" (e.g., 5 out of 5 items or at least 3 out of 5 items), information is needed from the relevant health-care providers.

In such cases, it is necessary to identify and state the method that will be used to develop the definitions of the variables or indicators.

Note, however, that in some studies the researcher is not primarily interested in measuring variables, but rather in **identifying** variables or clusters of variables that help explain a problem or reasons for success.

Scales of measurement (optional)

Because variables and indicators have different values, it is often possible to scale or rank them. Scaling is easy in the case of numerical variables. These can be scaled in different ways:

1. **Continuous scale**: this consists of a continuum of measurements.

   For example: Weight in kilograms, pounds, or grams;
   Hemoglobin level in the blood, expressed in grams per dL; or
   Income, measured in dollars.

2. **Ordinal scale**: numerical variables can also be categorized, and the categories can then be ranked in increasing or decreasing order:

For example: High income ($300 and above per month);
Middle income ($100-300 per month); and
Low income (less than $100 per month).

Home-clinic distance: Far (10 km and above);
Reasonably near (5-10 km); and
Near (less than 5 km).

It is obvious that the definition of what we would call high (income) or far (distance) will vary from country to country and from region to region. If the researcher has little idea about the distribution of a certain variable in a population (**for example,** if you don't know whether 30%, 50%, or 95% are below the poverty line of $100 per month) it is advisable to categorize numerical data only after the pretest, or even after data collection (see **Module 13**).

It is less easy to scale or rank nonnumerical data. Categorical variables such as sex (male, female) or main food crops (maize, millet, rice, etc) cannot be scaled, as there is no ranking order in the categories. We call this **nominal data**. However, certain categorical variables can be scaled on an **ordinal scale**.

For example:

Disability: no disability, partial disability, serious or total disability.
Seriousness of a disease: severe, moderate, mild.
Agreement with a statement: fully agree, partially agree, fully disagree.

For examples of scales of measurement, see **Annex 8.1**. We will come back to the issue of scaling in **Module 22**, as continuous, ordinal, and nominal data require different statistical tests.

Dependent and independent variables

Because in health systems research you often look for causal explanations, it is important to make a distinction between **dependent** and **independent variables**.

The variable that is used to describe or measure the problem under study is called the DEPENDENT variable.

The variables that are used to describe or measure the factors that are assumed to cause or at least to influence the problem are called the INDEPENDENT variables.

For example, in a study of the relationship between smoking and lung cancer, "suffering from lung cancer" (with the values yes, no) would be the dependent variable and "smoking" (varying from not smoking to smoking more than three packets a day) the independent variable.

Whether a variable is dependent or independent is determined by the statement of the problem and the objectives of the study. It is, therefore, important when designing a study to clearly state which variable is the dependent and which are the independent ones.

> If a researcher investigates why people smoke, "smoking" is the dependent variable, and "pressure from peers to smoke" could be an independent variable. Note that in the lung cancer study "smoking" was the independent variable.

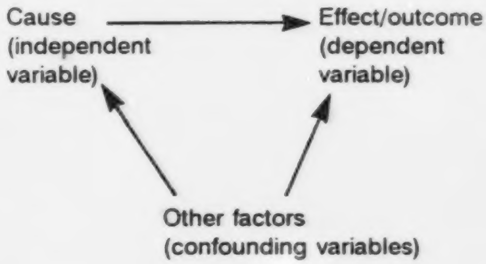
EXERCISE:

Look at your analysis diagram and give an example of a dependent variable and an independent variable in your own study.

Although in everyday language we may speak of possible **CAUSES** of problems, in scientific language we prefer to speak of **ASSOCIATIONS** between variables, unless a causal relationship can be proven. If we find an association between smoking and cancer, we can conclude that smoking **causes** cancer only if we can both demonstrate that the cancer was developed **after** the patient started smoking and that there are no other factors that may have caused both the cancer and the habit of smoking. Nervous people, for example, may both smoke more and suffer more from cancer, than persons who are not nervous.

A variable that is associated with the problem **and** with a possible cause of the problem is a potential CONFOUNDING VARIABLE.

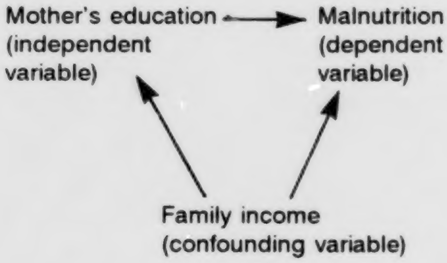
A confounding variable may either strengthen or weaken the apparent relationship between the problem and a possible cause.



Therefore, to give a true picture of cause and effect, the confounding variables must be considered, either at planning stage or while doing data analysis.

For example:

A relationship is shown between the low level of the mother's education and malnutrition in under-5s. However, family income may be related to the mother's education as well as to malnutrition.


Mother's education (independent variable)
Malnutrition (dependent variable)
Family income (confounding variable)

Family income is therefore a potential confounding variable. To give a true picture of the relationship between mother's education and malnutrition, family income should also be considered and measured. This could either be incorporated into the research design, for example by selecting only mothers with a specific level of family income, or it can be taken into account in the analysis of the findings, with mother's education and malnutrition among their children being analyzed for families with different categories of income.

Background variables

In almost every study, **BACKGROUND VARIABLES** appear, such as age, sex, educational level, socioeconomic status, marital status, and religion. These background variables are often related to a number of independent variables, so that they influence the problem indirectly. (Hence they are called background variables.) If the background variables are important to the study, they should be measured. However, try to keep the number of background variables measured as few as possible, in the interest of economy. Background variables are notorious "confounders."

Summary

In summary, taking our analysis diagram as a starting point, we have to identify for our particular study:

- What the variables are for each specific objective and which are the independent, dependent, confounding and background variables;
- Which variables can be measured as they are;
- Which variables need to be operationalized, by choosing indicators to measure them, and what definitions are needed for the variables and indicators that have been selected; and
- Which variables need further information to be defined adequately.

Note 1

If you do a purely **descriptive** study, for example an inventory of knowledge, attitudes, and practices related to bilharzia (schistosomiasis) or AIDS, you do not need to differentiate between dependent and independent variables. In this type of study, you may simply concentrate on variables and indicators that define knowledge, attitudes, and practices.

Note 2

When you select the variables for your study, it is important to review your objectives, as well as your analysis diagram. When you review your objectives you may find that you need some new variables not originally included on your analysis diagram. On the other hand, you may discover that your objectives are too vague and can be revised and clarified, now that you have identified your variables. You should continue to adjust your analysis diagram, variables, and objectives until they are all in line with each other.

EXERCISE: Identification of variables in research

(to be carried out in plenary, 1/2 hour)

Look at the following descriptions of research problems and then answer the questions that follow.

Problem 1

A health researcher believes that in a certain region anemia, malaria, and malnutrition are serious problems among adult males and, in particular, among farmers. He wishes to study the prevalence of these diseases among adult males of various ages, occupations, and educational backgrounds to determine how serious a problem these diseases are for this population.

Questions:
- What are the dependent and independent variables in the study?
- Which of these are categorical and which are numerical variables?

Problem 2

A District Medical Officer (DMO) receives a complaint from the community that Village Health Workers (VHWs) often run out of chloroquine. In preliminary investigations, this shortage of chloroquine is confirmed. VHWs get their drugs at monthly meetings at the health centre. The DMO decides to investigate why the supply of drugs to VHWs is unsatisfactory.

Questions:
- What is the dependent variable in the study?
- What would be a meaningful indicator for the dependent variable?
- How would you define "short of chloroquine"?
- Can you think of some independent variables?
- Which independent variables are "measurable" as they are and which need indicators?

Problem 3

Occasionally, a research project is carried out without considering some of the important variables. This may result in deceptive findings or an unclear relationship between independent and dependent variables.

In a study concerning the patterns of distribution of schistosomiasis in the adult population of a village community, a researcher found that the adults were predominantly farmers and that 20% of them had schistosomiasis. The researcher believed that the prevalence of the disease was moderately low in the adult population.

Question:
- Are there any variables whose inclusion in the study might have shown that prevalence of the disease varied greatly among different categories of adults in the village?

GROUP WORK (2½ hours)

1. Using the diagram of factors that possibly influence the problem you are studying (the diagram that you prepared for the statement of the problem), identify for each of these factors the variables that will be included in your study:

   - What is/are you dependent variable(s)? (List them.)
   - What are your independent variables? (List them.)
   - Which variables can be "measured" as they are?
   - Choose appropriate indicators for the variables that are not measurable as they are and/or formulate appropriate definitions for variables/indicators, if required.
   - Determine which variables need further information to be defined adequately.

Use the table below for your work.

	Variable	Indicators (if needed) or further definition	Further exploration needed?	Which objective covered?
Dependent variable(s)	1. ____ 2. ____	____ ____		
Independent variables	1. ____ 2. ____ 3. ____ 4. ____ 5 ____ etc.			

2. In the table, we have included a column to state **which objective** is covered by your variables. You may discover that some objectives are not well covered by your variables (probably because your analysis diagram and objectives are not yet completely in line with each other). If so, you need to rethink whether the objectives are important ones and, if so, develop variables to measure them. You may discover that your objectives are too vague when compared to the type of data (or to variables) you would like to collect. If so, you should make your objectives more specific.

   Before you finish you should review, as a group, your problem analysis diagram, objectives, and variables, and make any adjustments needed so they are all in line with each other.

Annex 8.1. Example of a framework for defining variables.

Conceptual definition of variable	Operational definition, i.e., indicator	Scale of measurement
Age	Age at last birthday	Continuous, in months
Hemoglobin level	Hemoglobin concentration in capillary blood, measured by hemoglobinometer	Continuous, e.g., grams per 100 mL, rounded off to nearest gram

Nutritional status	Weight in relation to age compared to a standard growth curve	Ordinal, e.g.,
		well nourished = >80% of standard;
		moderately malnourished = 60-80% of standard;
		severely malnourished = <60% of standard

Patient satisfaction	Response to a specific question put to patients	Ordinal, e.g., 1. very satisfied; 2. satisfied on the whole; 3. somewhat dissatisfied; 4. very dissatisfied; 5. don't know; 6. no answer.
Immunization coverage	Percentage of children immunized in a particular age group	Continuous, e.g., percentages OR ordinal: high = >80% medium = 60-80% low = <60%
Main source of carbohydrate in the diet	Main type of staple food eaten	Nominal, e.g., maize, millet, rice, cassava

Annex 8.2. Possible alternatives when attempting to define frequently used variables[1]

Occupation	Occupation for which subject was trained (profession or trade), or work actually performed? If retired or unemployed, will previous occupation be used? Will women by classified by their own or their husbands' occupations or both?
Education	Number of years of education, or last grade attained, or type of educational institution last attended?
Income	Personal income, family income, or average family income per member?
Crowding	(Mean number of persons per room in housing unit) What rooms are excluded from the index (bathrooms, showers, toilets, kitchens, store-rooms, rooms used for business purposes, entrance halls)?
Social class	Based on occupation, education, crowding index, income, neighbourhood or residence, home amenities, or subject's self-perception? Based on one of these, or a combination?
Marital status	In terms of legal status (single, married, widowed, or divorced) or in terms of stability (e.g., stable union, casual union).
Parity	Total number of previous pregnancies, or total number of children delivered?
Date of onset of disease	Date when first symptoms were noticed, or date when first diagnosed, or date of notification?
Presence of chronic disease	Based on duration since onset? If so, what duration makes it chronic — 3 months, 6 months, 1 year? Based on presence of certain diseases? Are some diseases defined as chronic disease whatever their duration? If so, what diseases? What about conditions that come and go (e.g., frequently recurrent sore throats)?
Hospitalization	Is hospitalization for childbirth included? Is the hospital stay of a well newborn baby included? Is overnight stay essential? Is overnight stay in a casualty ward included?

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[1] Adapted from Abramson (1984).

Module 8: VARIABLES

Timing and teaching methods

½ hour	Introduction and discussion (including first exercise)
½ hour	Exercise: Identification of variables in research (and discussion of answers)
2½ hours	Group work
1 hour	Plenary
4½ hours	TOTAL TIME

Introduction and discussion

- Stress that it is important to define the problem as well as the factors influencing the problem in measurable terms.

- Let participants give some examples of numerical variables and discuss what different values these variables may have.

- Let participants give examples of categorical variables, after you have provided one or two examples. Make sure they understand that once you have clear categories, you can "measure" those variables, which means that you can determine their different values.

- Make sure that the participants understand that certain variables can be "measured" directly and that others need indicators before they can be measured.

  Note: We use quote marks to indicate that "measuring" of categorical variables such as sex or mode of transport means "determining their values."

- Discuss the relationship of the concept of dependent and independent variables to causality.

Exercise: Examples of dependent and independent variables

- Let the groups give examples from their own studies.

- Explain the difference between association and cause.

- Explain clearly that variables with values such as low, medium, and high or sick and well need operational definitions to explain just what these values mean.

- Stress that sometimes measuring variables is not our concern, but rather identifying and describing them (if we know very little about possible causes of a problem).

- Stress the fact that when participants are working to list variables they have identified in their analysis diagram, they should also go back to their objectives to ensure that each objective is adequately covered. Because certain variables may need to be measured for several objectives it would be more complicated to start identifying variables by looking at the objectives rather than the analysis diagram.

Exercise: Identification of variables in research

- Conduct the exercise on Identification of variables in research during the plenary session. Ask the participants to read and respond to the questions posed for each problem in the exercise individually or in small groups of two or three people. Give 4-5 minutes for each of the three problems, immediately followed by a group discussion. (Suggested answers are on the following pages.)

Group work

- Ask the participants to meet in their working groups to select the variables that will be involved in the study being designed.

  Each group should then prepare a list of the selected variables for presentation and discussion in plenary and for inclusion in the methodology section of their research proposal.

Answer sheet for exercise on identification of variables in research

(The following answers are by no means exhaustive)

Problem 1

Dependent variables:

- Presence or absence of malaria - categorical
- Presence or absence of anemia - categorical
  or hemoglobin level in the blood - numerical
- Presence or absence of malnutrition - categorical
  or percentage of standard growth curve - numerical

Independent variables

- age - numerical
- occupation - categorical
- educational background
  years of schooling - numerical
  type of school - categorical

Problem 2

Dependent variable

- Availability of chloroquine for village health workers

Indicator for availability of chloroquine

"Short of chloroquine" should be defined in relation to the time since the date of the last drug supply and ideally also in relation to the size of the population.

For example

If the number of tablets in stock is measured for all VHWs 2 weeks after the date of the last meeting at the Health Centre where drugs were supplied, one could say that any VHW who does not have enough drugs to treat 1% of the population for malaria is short of drugs. Because an adult needs 10 tablets for a full course, this would mean that a VHW should have at least 50 tablets available, if the village had a population of 500.

An alternative definition could be having **no** tablets in stock two weeks after the last date of supply.

Independent variables

- Availability of drugs at the Health Centre (influenced by frequency of ordering and frequency of supply);

- Amount of drugs monthly supplied to VHWs;

- Number of weeks since the VHWs last came in for their supply of chloroquine;

- Number of patients treated since date of last supply.

Problem 3

Important **independent variables** that should have been taken into account include:

- Division of labour,
- Age,
- Season,
- Location in the village,
- Contact with water, and
- Farming activities.

Closer study revealed that schistosomiasis was present among 70% of the young farmers between 20-25 years of age, while it was almost entirely absent in farmers older than 50 years of age. It turned out that younger farmers tended to have farms much further away from the village where the land was more fertile, and they had to cross a river where they bathed on their way home in the evening. The older farmers, on the other hand, had always had their farms close to the village and obtained water from wells.

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 9:

STUDY TYPE

Steps in the development of an HSR proposal

Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 9: STUDY TYPE

OBJECTIVES

At the end of the session, you should be able to:

1. **Describe** the study designs most often used in HSR and the uses and limitations of each type of study design.
2. **Describe** how the study design can influence the validity and reliability of the study results.
3. **Identify** the most appropriate study design for the research proposal you are developing.

I. Introduction

II. Overview of study types

III. Deriving valid and reliable conclusions

I. INTRODUCTION

Depending on the existing state of knowledge about a problem that is being studied, different types of questions may be asked that require different study designs. Some examples are given in Table 9.1.

Table 9.1. Research questions and study designs.

State of knowledge of the problem	Type of research questions	Type of study design
Knowing that a problem exists, but knowing little about its characteristics or possible causes	What is the nature/magnitude of the problem? Who is affected? How do the affected people behave? What do they know, believe, think about the problem?	Exploratory studies or descriptive studies: Descriptive case studies Cross-sectional surveys
Suspecting that certain factors contribute to the problem	Are certain factors indeed associated with the problem? (e.g., Is lack of preschool education related to low school performance? Is low fibre diet related to carcinoma of the large intestine?)	Analytical (comparative) studies: Cross-sectional comparative studies Case-control studies Cohort studies
Having established that certain factors are associated with the problem; desiring to establish the extent to which a particular factor causes or contributes to the problem	What is the cause of the problem? Will the removal of a particular factor prevent or reduce the problem? (e.g., stopping smoking, providing safe water)	Cohort studies Exerimental or quasiexperimental study designs
Having sufficient knowledge about cause to develop and assess an intervention that would prevent, control, or solve the problem	What is the effect of a particular intervention/strategy? (e.g., treating with a particular drug, being exposed to a certain type of health education) Which of two alternative strategies gives better results? Are the results in proportion to time/money spent?	Experimental or quasiexperimental study designs

The type of study design chosen depends on:

- The type of problem,
- The knowledge already available about the problem, and
- The resources available for the study.

When investigating health-management problems, such as overcrowding in a hospital out-patient department or shortage of drugs at PHC level, a good description of the problem and identification of major contributing factors often provides enough information to take action.

When exploring more complicated management problems and many health problems, we usually want to go further and determine the extent to which one or several independent variables contributes to the problem (for example, the contribution of low-fibre diet to cancer of the large intestine). For these types of problems, more rigorous analytical or quasiexperimental studies will have to be conducted before we decide on appropriate interventions.

II. OVERVIEW OF STUDY TYPES

Several classifications of study types are possible, depending on what research strategies are used. Usually a combination of research strategies is used, including:

- **Nonintervention studies** in which the researcher just describes and analyzes researchable objects or situations but does not intervene; and

- **Intervention studies** in which the researcher manipulates objects or situations and measures the outcome of his manipulations (e.g. by implementing intensive health education and measuring the improvement in immunization rates).

Nonintervention studies

We will first concentrate on nonintervention studies and their use in HSR. We will discuss:

- Exploratory studies,
- Descriptive studies, and
- Comparative (analytical) studies.

1. Exploratory studies

An EXPLORATORY STUDY is a small-scale study of relatively short duration, which is carried out when little is known about a situation or a problem.

For example

A national Acquired Immunodeficiency Syndrome (AIDS) control program wishes to establish counseling services for Human Immunodeficiency Virus (HIV) positive and AIDS patients, but lacks information on specific needs patients have for support. To explore these needs, a number of in-depth interviews are held with various categories of patients (males, females, married, single) and with some counsellors working on a program that is already under way.

When doing exploratory studies we DESCRIBE the needs of various categories of patients and the possibilities for action. We may want to go further and try to explain the differences we observe (e.g., in the needs of male and female AIDS patients) or to identify causes of problems. Then we will need to COMPARE groups.

Note

Comparison is a fundamental research strategy to identify variables that help explain why one group of persons or objects differs from another.

In HSR, **small-scale studies that compare extreme groups** are very useful for detecting management problems. We could, for example, compare:

- Two health centres that are functioning well and two that do not function satisfactorily to detect the possible reasons for bottlenecks in the functioning of the peripheral services;[1]

- One community with high and another with low participation in health activities to identify factors that contribute to community participation;[1]

- 40 mothers who delivered in a maternity ward and 40 who delivered at home to find reasons for the low percentage of supervised deliveries.

Exploratory studies gain in explanatory value if we **approach the problem from different angles at the same time**. In the study that is looking for causes of the low percentage of supervised deliveries, it may be very useful to include observations and interviews with health staff in the maternity centres that should serve the mothers in question and interviews with their supervisors, as well as with the mothers themselves. In this manner, **information from different independent sources can be cross-checked**.

For some management problems, such a "rapid appraisal" may provide sufficient information to take action. Otherwise, a larger, more rigorous comparative study will have to be developed to test differences between groups with respect to various independent variables.

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[1] Such small-scale studies may be called exploratory case studies if they lead to plausible assumptions about the causes of the problem and explanatory case studies if they provide sufficient explanations to take action (Yin 1984).

Note:

If the problem and its contributing factors are not well defined (see **Module 8** group work) it is **always advisable** to do an **exploratory study** before embarking on a large-scale descriptive or comparative study.

2. Descriptive studies

A DESCRIPTIVE STUDY involves the systematic collection and presentation of data to give a clear picture of a particular situation.

Descriptive studies can be carried out on a small or large scale.

Descriptive case studies[2] describe in-depth the characteristics of one or a limited number of "cases." A case may be, for example, a patient, a health centre, or a village. Such a study can provide useful insight into a problem. Case studies are common in social sciences, management sciences, and clinical medicine. For example, in clinical medicine the characteristics of a hitherto unrecognized illness may be documented as a case study. This is often the first step toward building up a clinical picture of that illness.

However, if one wishes to test whether the findings pertain to a larger population, a more extensive, cross-sectional survey has to be designed.

Cross-sectional surveys aim at quantifying the distribution of certain variables in a study population at one point of time. They may cover, for example:

- **Physical characteristics** of people, materials, or the environment, as in
  - prevalence surveys (of bilharzia, leprosy), or
  - evaluation of coverage (of immunization, latrines, etc,),
- **Socioeconomic characteristics** of people, such as their age, education, marital status, number of children, and income,
- The **behaviour** of people and the **knowledge, attitudes, beliefs, and opinions** that may help to explain that behaviour (KAP studies), or
- **Events** that occurred in the population.

Cross-sectional surveys cover a sample of the population. If a cross-sectional study covers the total population it is called a **census**.

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[2] Descriptive case studies that lead to the construction of theories may be very time consuming. If they are of short duration, you may as well call them exploratory studies.

A cross-sectional survey may be repeated to measure changes over time in the characteristics that were studied.

The surveys may be very **large**, with hundreds or even thousands of study units. In these cases only a **limited number of variables** will usually be included, to avoid problems with analysis and report writing. If cross-sectional surveys are **smaller** they can be **more complex**. They may include all the elements just mentioned. Small surveys can reveal interesting associations between certain variables, e.g., between having leprosy and socioeconomic status, sex, and education.

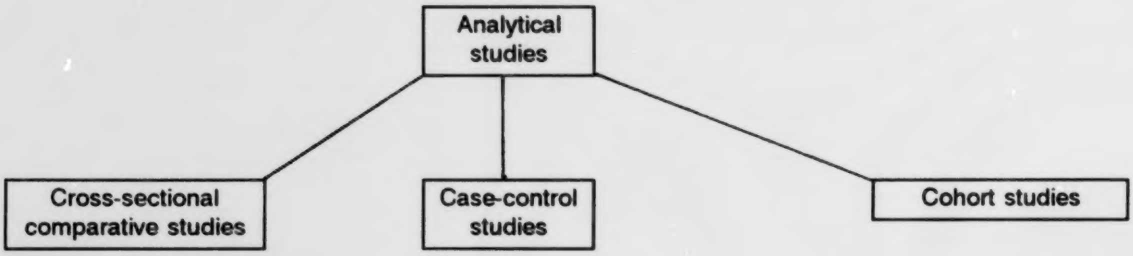
Researchers often go further and will combine a DESCRIPTION of the study population with a COMPARISON of a number of groups within that population (see below). Such combinations are very common and thus the distinctions between descriptive and comparative studies are sometimes quite fuzzy.

3. Comparative or analytical studies

> An ANALYTICAL STUDY attempts to establish **causes or risk factors** for certain problems. This is done by comparing two or more groups some of which have or develop the problem and some of which have not.

Three commonly used types of analytical studies are discussed here.

Figure 9.1. Types of analytical studies.



Cross-sectional comparative studies

Many cross-sectional surveys focus on comparing **as well as** describing groups.

For example, a survey on malnutrition may wish to establish:

- The percentage of malnourished children in a certain population;
- Socioeconomic, physical, political variables that influence the availability of food;
- Feeding practices; and
- The knowledge, beliefs, and opinions that influence these practices.

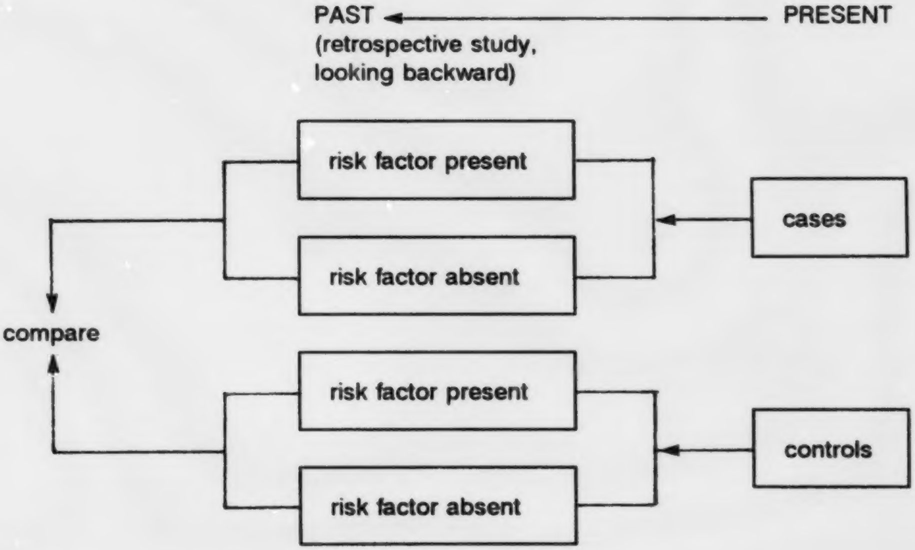
The researcher will not only describe these variables but, by comparing malnourished and well nourished children, he or she will try to determine which socioeconomic, behavioural, and other independent variables have contributed to malnutrition.

In any comparative study, one has to watch out for CONFOUNDING or INTERVENING variables. (Please refer to Module 8 for examples and discussion.)

Case-control studies

In a CASE-CONTROL STUDY, the investigator compares one group among whom a problem is present (e.g., malnutrition) with another group, called a control or comparison group, where the problem is absent to find out what factors have contributed to the problem.

Figure 9.2. Diagram of a case control study.[3]


PAST
PRESENT
(retrospective study, looking backward)
risk factor present
risk factor absent
cases
compare
risk factor present
risk factor absent
controls

For example, in a study of the causes of neonatal death the investigator first selects his "cases" (children who died within the first month of life) and "controls" (children who survived their first month of life). He then interviews their mothers to compare the history of these two groups of children, to determine whether certain risk factors are more prevalent among the children who died than among those who survived.

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[3] Adapted from Holland et al. 1985.

As with a cross-sectional comparative study, the researcher has to control for CONFOUNDING VARIABLES. In case-control studies, this may be done to some extent beforehand, by MATCHING the groups for expected confounding variables. Matching means taking care that the cases and controls are similar with respect to the distribution of one or more potentially confounding variables.

> **For example**, in the study on possible causes of neonatal death we would like to match the mothers for age (as this factor could influence death), as well as for other socioeconomic variables (education, marital status, and economic status). We might select, for each mother of a baby that died within a month after birth, a mother of exactly the same age whose baby did not die. We might also match the groups on environment and select "controls" from the same village as "cases".

Note:

Although ideally a researcher would like to match the cases and controls for all variables except the ones he is testing as risk factors or "causes" for the problem under study, this is in practice impossible, even inadvisable. (You might "match away" variables you are interested in.) Case-control studies, therefore, use stratification as well as matching to control for confounding variables.

Cohort studies

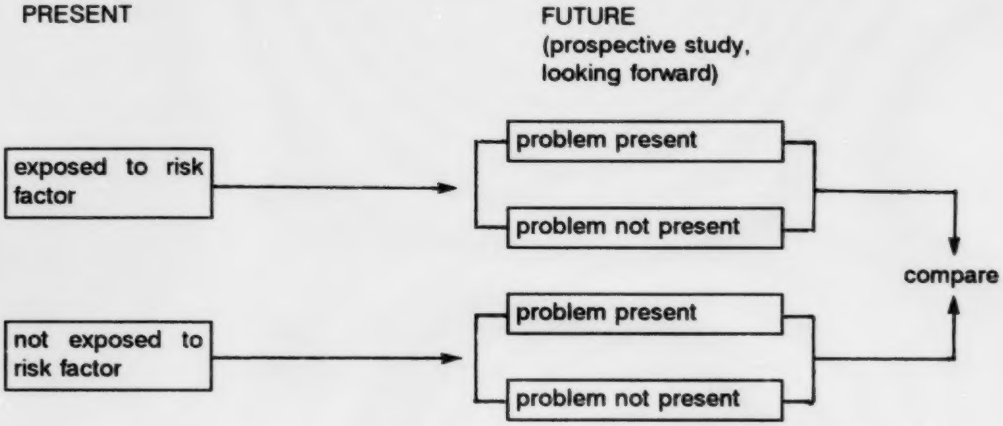
In a COHORT STUDY, a group of individuals that is exposed to a risk factor (study group) is compared with a group of individuals not exposed to the risk factor (control group). The researcher follows both groups over time and compares the occurrence of the problem that he or she expects to be related to the risk factor in the two groups to determine whether a greater proportion of those with the risk factor are indeed affected.

A well known **example** of a cohort study is the Framingham study of smokers and nonsmokers that was conducted to determine the importance of smoking as a risk factor for developing lung cancer.

A study may start with one large cohort. After the cohort is selected, the researchers may then determine who is exposed to the risk factor (e.g., smoking) and who is not, and follow the two groups over time to determine whether the study group develops a higher prevalence of lung cancer than the control group. If it is not possible to select a cohort and divide it into a study group and a control group, two cohorts may be chosen, one in which the risk factor is present (study group) and one in which it is absent (control group). In all other respects the two groups should be as alike as possible.

The control group should be selected at the same time as the study group, and both should be followed with the same intensity.

Figure 9.3. Diagram of a cohort study.[4]


PRESENT
FUTURE
(prospective study,
looking forward)
exposed to risk factor
not exposed to risk factor
problem present
problem not present
problem present
problem not present
compare

Uses and limitations of different types of analytical studies

You may use any of the three types of analytical studies (cross-sectional comparison, case-control, or cohort) to investigate possible causes of a problem.

For example, if you assume there is a causal relationship between the use of a certain water source and the incidence of diarrhea among children under 5 years of age in a village with different water sources:

- You can select a group of children under 5 years and check at regular intervals (e.g., every 2 weeks) whether the children have had diarrhea and how serious it was. Children using the suspected source and those using other sources of water supply will be compared with regard to the incidence of diarrhea (**cohort study**).
- You can also conduct a **case-control study**. For example, you may compare children who present themselves at a health centre with diarrhea (cases) during a particular period of time with children presenting themselves with other complaints of roughly the same severity, for example acute respiratory infections (controls) during the same time, and determine which source of drinking water they had used.
- In a **cross-sectional comparative study**, you could interview mothers to determine how often their children have had diarrhea during, for example, the past month, obtain information on their source of drinking water, and compare the source of drinking water of children who did and did not have diarrhea.

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[4] Adapted from Holland, W.W. et al. 1985. *Oxford textbook of public health, volume 3: investigative methods in public health*. Oxford University Press, Oxford, England.

Cross-sectional comparative studies or case-control studies are usually preferred to cohort studies for financial and practical reasons.

Cross-sectional comparative studies and **case-control studies** are relatively quick and inexpensive to undertake. With cross-sectional comparative studies, however, the number of stratifications one can make is limited by the size of the study. The major problem with case-control studies is the selection of appropriate control groups. The matching of cases and controls has to be done with care.

Cohort studies are the only sure way to establish causal relationships. However, they take longer than case-control studies and are **labour intensive** and, therefore, **expensive**. The major problems are usually related to the identification of all cases in a study population especially if the problem has a low incidence, and to the inability to follow up all persons included in the study over a number of years because of population movement.

2. INTERVENTION STUDIES

In intervention studies, the researcher manipulates a situation and measures the effects of this manipulation. Usually (but not always) two groups are compared, one in which the intervention takes place (e.g., treatment with a certain drug) and another group that remains "untouched" (e.g., treatment with a placebo).

The two categories of intervention studies are:

- experimental studies and
- quasiexperimental studies.

1. Experimental studies

An experimental design is the only type of study design that can actually **prove** causation.

In an EXPERIMENTAL STUDY, individuals are randomly allocated to at least two groups. One group is subject to an intervention, or experiment, while the other group(s) is not. The outcome of the intervention (effect of the intervention on the dependent variable/problem) is obtained by comparing the two groups.

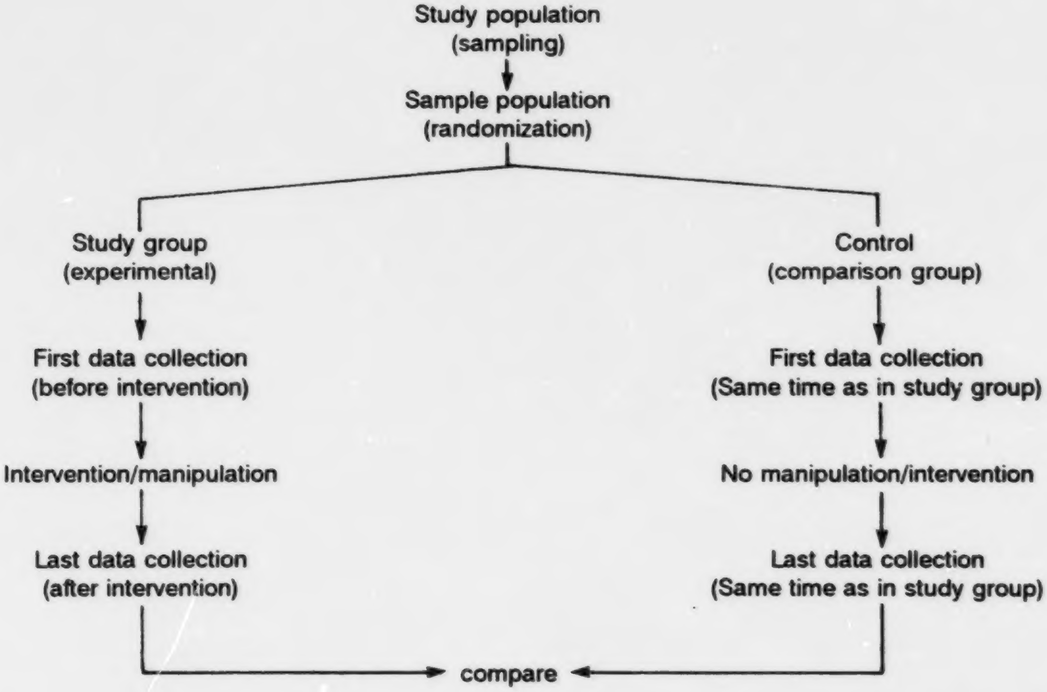
The classical experimental study design has three characteristics:

- **MANIPULATION** - the researcher does something to one group of subjects in the study.

- **CONTROL** - the researcher introduces one or more control group(s) to compare with the experimental group.

- **RANDOMIZATION** - the researcher takes care to randomly assign subjects to the control and experimental groups. (Each subject is given an equal chance of being assigned to either group, e.g., by assigning them numbers and "blindly" selecting the numbers for each group.)

Figure 9.4. Diagram of an experimental study.


Study population
(sampling)
Sample population
(randomization)
Study group
(experimental)
Control
(comparison group)
First data collection
(before intervention)
First data collection
(Same time as in study group)
Intervention/manipulation
No manipulation/intervention
Last data collection
(after intervention)
Last data collection
(Same time as in study group)
compare

Note

The strength of experimental studies is that by randomization the researcher eliminates the effect of confounding variables.

A number of experimental study designs have been developed. These are widely used in laboratory settings and also in clinical settings. For ethical reasons, the opportunities for experiments involving human subjects are restricted. However, randomized control trials of new drugs are common and this design is often considered for the testing of the efficacy of other interventions. Feasibility as well as ethics must be seriously considered in choosing this design.

> **For example,** a researcher plans to study the effect of a new drug. (The drug has already been tested extensively on animals and has been approved for trial use.) He plans to include 300 patients in the study who are currently receiving a standard treatment for the condition that the new drug has been designed to alleviate. He explains the study to the patients asking their consent to be divided into two groups on a random basis. One group will receive the experimental drug while the other group will continue to receive the standard treatment. He makes sure that the medications are disguised and labelled in such a manner that neither the research assistant administering them nor the patient knows which drug is used. (This is called a "double blind" experiment.)

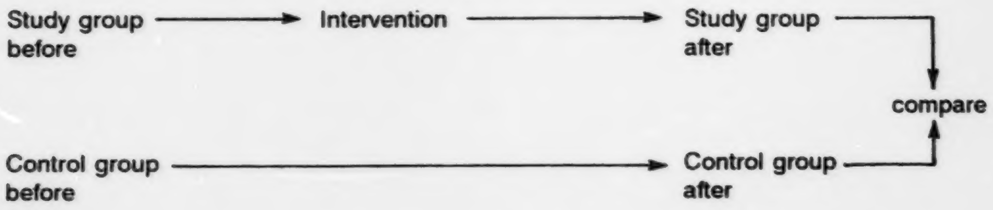
At community level, where HSR is frequently undertaken, we experience not only ethical but also practical problems in carrying out experimental studies. In real life settings, it is often impossible to assign persons at random to two groups, or to maintain a control group. Therefore, experimental research designs may have to be replaced by quasiexperimental designs.

2. Quasiexperimental studies[5]

In a QUASIEXPERIMENTAL STUDY, at least one characteristic of a true experiment is missing, either randomization or the use of a separate control group. A quasiexperimental study, however, always includes manipulation of an independent variable that serves as the intervention.

One of the most common quasiexperimental designs uses two (or more) groups, one of which serves as a control group in which no intervention takes place. Both groups are observed before as well as after the intervention, to test if the intervention has made any difference. The subjects in the two groups (study and control groups) have not been randomly assigned.

Figure 9.5. Diagram of a quasiexperimental design with two groups.



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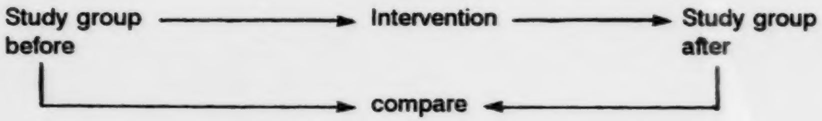
[5] For a more detailed explanation of experimental and quasiexperimental designs and their advantages and disadvantages, one excellent reference is Campbell and Stanley (1963).

Example of a quasiexperimental study

> A researcher plans to study the effects of health education on the level of participation of a village population in an immunization campaign. She decides to select one village in which health education sessions on immunization will be given and another village that will not receive health education to serve as a control. The immunization campaign will be carried out in the same manner in both villages. A survey will then be undertaken to determine if immunization coverage in the village where health education was introduced before the campaign is significantly different from coverage in the "control" village which did not receive health education. (Note: The study is quasiexperimental because the subjects were not assigned to the control or experimental groups on a random basis).

Another type of design that is often chosen because it is quite easy to set up uses only **one group** in which an intervention is carried out. The situation is analyzed before and after the intervention to test if there is any difference in the observed problem. This is called a "BEFORE-AFTER" study.[6]

Figure 9.6. Diagram of a before-after study.



Example of a before-after study:

> The outpatient clinic of hospital X is extremely crowded. Waiting times of over 5 hours for patients before they are attended to are not uncommon. The hospital management has a study carried out to analyze the bottlenecks and implements most of the recommendations made. Three months later, another study is done to check to what extent the bottlenecks have been solved and where further action is necessary.

This design is often used for management problems that pertain to one single unit (hospital, school, village). However, if the problems occur at a larger scale or if they might be influenced by other factors **apart from the intervention** during the trial, it is highly recommended that the design include both a study *and* a control group.

In the trial with health education on immunization, **for example,** it would have been quite risky to work without a control group. Outside events (such as a health education campaign on immunization by radio or other mass media) might have led to improved knowledge on immunization in both the study grou p and the control group. (Note: The immunization campaign by radio provides a so-called "rival explanation" for your results.) If you had had just a study group and no control, you might have concluded erroneously that all of the increase was due to your own intervention.

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[6] This design is considered a "pre-experimental" design rather than quasiexperimental, because it involves neither randomization nor the use of a control group.

III. DERIVING VALID AND RELIABLE CONCLUSIONS

Whatever research design is selected, a primary concern is that the conclusions of the study be VALID and RELIABLE.

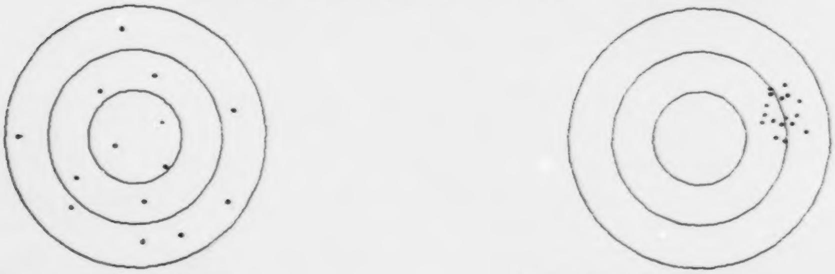
What are validity and reliability in research findings?

Validity means that the conclusions are true.

Reliability means that someone else using the same method in the same circumstances should be able to obtain the same findings.

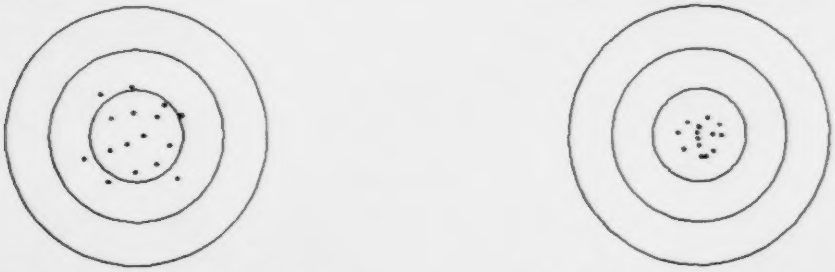
The following diagram illustrates the concepts of validity and reliability. We aim at the centre of the target, and if we hit it, our conclusions are true. If repeated attempts achieve similar results, they are reliable.

Figure 9.7. Validity and reliability, possible combinations.



Neither valid nor reliable
The aim does not hit the centre of the target, nor do repeat attempts hit the same spot.

Reliable but not valid
The aim does not hit the centre of the target (i.e., not "valid") but repeated attempts do hit almost the same spot.



Fairly valid but not very reliable
The aim is fairly close to the centre of the target (fairly valid) but repeated attempts do not hit the same spot, some are to the left, some to the right, etc. (not reliable).

Valid and reliable
The aim hits the centre of the target and repeated attempts hit the same spot.

For example

Four different teams of researchers set out to determine the body weights of three children whose true body weights were 10 kg, 15 kg, and 20 kg, respectively, and obtained the following four sets of results.

Team 1

Child	True body weight	First set of results	Neither
A	10 kg	8 kg	valid
B	15 kg	18 kg	nor
C	20 kg	19 kg	reliable

The first set of results is not valid because the body weights are not the true body weights. It is not reliable because the weights are sometimes too high and sometimes too low, and the relative difference from the true body weight varies from child to child.

Team 2

Child	True body weight	Second set of results	Reliable,
A	10 kg	11 kg	but
B	15 kg	16.5 kg	not
C	20 kg	22 kg	valid

The second set of results is not valid because the body weights are not the true body weights. It is reliable because the results are too high by the same proportion (10%) for every child.

Team 3

Child	True body weight	Third set of results	Fairly
A	10 kg	10.15 kg	valid but
B	15 kg	14.85 kg	not
C	20 kg	20.33 kg	reliable

The third set of results is fairly valid because the results are almost the true body weight. They are not reliable because two weights are too high and one is too low and the proportion by which they differ from the true body weight is different for each child.

Team 4

Child	True body weight	Fourth set of results	
A	10 kg	10 kg	Valid and reliable
B	15 kg	15 kg	
C	20 kg	20 kg	

The fourth set of results is both valid and reliable because they are the same as the true body weights, and these results are obtained for every child.

Selection of study design: eliminating threats to validity

Researchers try as far as possible to eliminate threats to validity through the selection of appropriate study designs.

Descriptive studies

In descriptive studies, information is collected from a sample and the findings are often used to make conclusions about the population. The threats to validity that are associated with sampling and data collection will be discussed in the modules on those subjects.

Analytic and interventional studies

In analytic and interventional studies, before arriving at conclusions on causality, i.e., before stating that either:

- Factor X caused/contributed to Problem Y (analytic studies); or
- Intervention A produced Effect B (interventional studies),

the existence of the following **threats to validity** must be considered. Threats to validity might render the conclusions untrue.

1. Confounding factors

Example

You might find that children who have had preschool education subsequently perform better in primary school. Can you conclude that preschool education leads to better school performance?

Rival or alternative explanations include:

- Educational level of parents may be contributing to both preschool education and school performance; and
- Income level, availability of education toys in the home, television etc., may be factors.

These are known as **confounding factors**. (Also see **Module 8**.)

2. **History**

Unexpected factors beyond your control might have produced the same effect as the intervention you were studying, thereby making it impossible for you to know whether it was your intervention that produced the impact.

Example

A well known example is when a certain agency that had established a program for early detection of breast cancer designed a study to test the effectiveness of the program by studying the increase in the proportion of women who reported doing self-examination of breasts. However, while the study was in progress the President's wife developed breast cancer and she appeared widely on mass media to advise women on early detection of breast cancer.

3. **Differential subject loss in various groups**

The type of subjects who drop out of your study or control groups may be related to some of the characteristics you are studying.

Example

You are studying the effectiveness of a "weight watchers" program by comparing the average weight loss in the weight watchers' group with that of a control group. However, a number of women in the weight watchers' group found the program too demanding and have dropped out.

4. **Selectivity (or bias) in assigning subjects to various groups**

Example

You intend to study whether a program on how to stop smoking will be effective in helping the smokers in your hypertension clinic. You invite those who would like to attend to register themselves. You plan to compare the percentage who stop smoking among those who attend the program with those who do not. However it is likely that those who register themselves are those who are strongly motivated to stop smoking while those who are not motivated do not join the program. (Also see **Module 11**.)

5. **Instrumentation**

Instrument reactivity: the instrument itself has an effect on the subjects and produces a distorted response.

Examples

- In a survey on alcoholism, you ask school children "Is your father an alcoholic?"
- In a study to evaluate how much a group of school children have learned from a series of talks on smoking you give them a set of true/false questions before the start of the series and repeat the same questions after the series of talks. (They have probably compared notes and become more proficient in answering the particular questions in your test).

Unreliability of instruments

Examples

- You want to determine the age of children in your study. You ask the mother or any child in the house, "How old is this child?"
- Your weighing scale is not adjusted to zero level.

(Also see **Module 10A.**)

6. **Hawthorne effect**

If a group is being observed to determine the effect of an intervention, the observed change may be due to the fact that the group is being studied rather than due to the intervention.

Strategies to deal with threats to validity

1. **Control group.** Observing a control group who are not exposed to the risk factor or intervention reduces threats due to history and Hawthorne effects and confounding factors. It should be noted that in HSR it is often very difficult to identify and maintain a control group because the control group can become contaminated, i.e., exposed to the intervention through factors beyond the control of the researcher.

2. **Random assignment of subjects to the group.** This reduces threats due to selectivity.

3. **Before and after measurements.** This allows us to assess whether there has been selectivity as well as differential loss of subjects. If there has been inevitable loss of subjects, it may enable assessment of the drop-outs to determine whether they had peculiar characteristics that distinguished them from those who did not drop out.

4. **Unobtrusive methods** of data collection and allowing adaptation time for subjects to get used to being observed serve to reduce Hawthorne effects.

5. **Careful design and pretesting** of instruments reduce bias due to instrumentation (see Module on data collection).

6. **Knowledge of environment events** enables the researcher to be sensitive to external events that could affect validity (i.e., history).

Selection of study design

In selecting the design of the study, you have to consider the type of information you want to obtain and devise strategies to enable you to obtain that information.

The selection of an appropriate research design depends on:

- The state of knowledge about the problem,
- The nature of the problem and its environment,
- The resources available for the research, and
- The ingenuity and creativity of the researcher.

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Module 9: STUDY TYPE

Timing and teaching methods

1 hour	Introduction and discussion
1 hour	TOTAL TIME

Introduction and discussion

It is helpful if participants read this module the evening before the presentation, so they are more familiar with the topic.

The goal of the module is to give participants an understanding of the major issues involved in choosing different research strategies rather than having them learn the various possible study types by heart.

Present Table 9.1 at the beginning of the module to illustrate basic questions that lead to the choice of different study types **without getting into the details concerning each type.** Then proceed with the detailed discussion of each study type. **Repeat the presentation of Table 9.1 at the end of the module**, summarizing the different study types that are possible.

It should be stressed that unless all variables to be investigated are clearly defined, small-scale studies are preferable to large-scale studies. A combination of study types can be considered if some variables still have to be explored (e.g., by open-ended questions) whereas other well-defined variables need to be measured on a larger scale (degree of utilization of services, for example).

Try to give examples of different study types in the fields in which the participants are interested. **Shorten** the presentation, especially of part III, if participants will not be engaged in analytical or quasi-experimental studies.

It is advisable to proceed with the presentation of **Module 10A** (Overview of Data-collection techniques) before participants do their group work to choose the type(s) of study they will use for their research projects. After **Module 10A**, the participants can be asked to do an exercise that involves selecting a study type as well as data-collection techniques for certain problems.

Note: The group work session on selection of study types is combined with group work on selection of data-collection techniques. It comes at the end of **Module 10A.**

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 10:

DATA-COLLECTION TECHNIQUES

A: OVERVIEW OF DATA-COLLECTION TECHNIQUES
B: DESIGN OF INTERVIEW SCHEDULES AND QUESTIONNAIRES
C: FOCUS GROUP DISCUSSIONS
D: OTHER DATA-COLLECTION TECHNIQUES

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 10A:

OVERVIEW OF DATA-COLLECTION TECHNIQUES

Steps in the development of an HSR proposal

Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 10A: OVERVIEW OF DATA-COLLECTION TECHNIQUES

OBJECTIVES

At the end of this session, you should be able to:

1. Describe various data-collection techniques and state their uses and limitations.
2. State the benefits of using a combination of different data-collection techniques.
3. State various sources of bias in data collection and ways of preventing bias.
4. Identify ethical issues involved in the implementation of research and ways of ensuring that your research informants or subjects are not harmed by your study.

I. Overview of data-collection techniques

II. Importance of combining different data-collection techniques

III. Bias in information collection

IV. Ethical considerations

I. OVERVIEW OF DATA-COLLECTION TECHNIQUES

Data-collection techniques allow us to **systematically** collect information about our objects of study (people, objects, and phenomena) and about the settings in which they occur.

In the collection of data we have to be systematic. If data are collected haphazardly, it will be difficult to answer our research questions in a conclusive way.

> **Example**
>
> During a nutrition survey three different weighing scales were used in three villages. The researchers did not record which scales were used in which village. After completion of the survey it was discovered that the scales were not standardized and indicated different weights when weighing the same child. It was, therefore, impossible to conclude in which village malnutrition was most prevalent.

Various data-collection techniques can be used such as:

- Using available information,
- Observing,
- Interviewing (face-to-face),
- Administering written questionnaires,
- Focus group discussions (FGD) (see Module 10C), and
- Other data-collection techniques (see Module 10D).

Using available information

Usually there is a large body of data already collected by others, although it may not necessarily have been analyzed or published. Locating sources and retrieving the information is a good starting point in any data collection effort.

For example, analysis of the information routinely collected by health facilities can be very useful for identifying problems in certain interventions or in flows of drug supply, or for identifying increases in the incidence of certain diseases. Sometimes the factcrs contributing to the problem may also be identified from the same source; sometimes additional research will be necessary to solve the problem.

Analysis of health information system data, census data, unpublished reports, and publications in archives and libraries or in offices at the various levels of health and health-related services may be a study in itself. Usually, however, it forms part of a study in which other data-collection techniques are also used. To retrieve data from available sources, the researcher will have to design an instrument such as a checklist or compilation sheet. In designing such instruments, it is important to inspect the layout of the source documents from which data are to be extracted and design the compilation sheet so that items can be transferred in the order in which they appear in the source document. This will save time and reduce error.

The advantage of using existing data is that collection is inexpensive. However, it is sometimes difficult to gain access to the records or reports required, and the information may not always be complete and precise enough. Another limitation of data from available sources is that they sometimes are out of date, as is often the case with census data. Also, the definitions and methods of recording the data may vary from one health facility to another or may have changed over a period of time. The researcher should check for such sources of possible error or bias when using available data.

Observing

OBSERVATION is a technique that involves systematically selecting, watching, and recording behaviour and characteristics of living beings, objects, or phenomena.

Observation of human behaviour is a much-used data-collection technique. It can be undertaken in different ways:

- **Participant observation:** The observer takes part in the situation he or she observes.
- **Nonparticipant observation:** The observer watches the situation, openly or concealed, but does not participate.

Observations may serve different purposes. They can give additional, more accurate information on behaviour of people than interviews or questionnaires: questionnaires may be incomplete because we forget to ask certain questions and informants may forget or be unwilling to mention certain things. Observations can, therefore, check on information collected (especially on sensitive topics such as alcohol or drug use, or stigmatization of leprosy, tuberculosis, epilepsy, or AIDS patients). Or they may be a primary source of information (observations of children's play, for example, collected in a systematic way).

Observations of human behaviour can form part of any type of study, but as they are time consuming they are most often used in small-scale studies.

Observations can also be made on **objects**. For example, the presence or absence of a latrine and its state of cleanliness may be observed.

If observations are made using a defined scale they may be called **measurements**. Measurements usually require additional tools. For example, in nutritional surveillance, we measure weight and height by using weighing scales and a measuring board. We use thermometers for measuring body temperature.

Interviewing

An INTERVIEW is a data-collection technique that involves oral questioning of respondents, either individually or as a group.

Answers to the questions posed during an interview can be recorded by writing them down (either during the interview itself or immediately after the interview) or by tape recording the responses.

Interviews can be conducted with varying degrees of flexibility. The two extremes, high and low degree of flexibility, are described below:

- High degree of flexibility:

  For example
  Interviews using an interview schedule, to ensure that all issues are discussed, but allowing flexibility in timing and the order in which the questions are asked. The interviewer may ask additional questions on the spot to gain as much useful information as possible. Questions are open-ended: the respondent is unrestricted in what and how he answers.

The unstructured or loosely structured method of asking questions can be used for interviewing individuals as well as groups of key informants. (For details concerning focus group discussions, see Module 10C).

A flexible method of interviewing is useful if a researcher has as yet little understanding of the problem or situation he or she is investigating. It is frequently applied in exploratory studies and also used during case studies.

- Low degree of flexibility:

  For example
  Interviews using a questionnaire with a fixed list of questions in a standard sequence that have mainly fixed or precategorized answers. (See Module 10B, Questionnaire design.)

Less flexible methods of interviewing are useful when the researcher is relatively knowledgeable about expected answers and when the number of respondents being interviewed is relatively large.

Administering written questionnaires

A WRITTEN QUESTIONNAIRE (also referred to as self-administered questionnaire) is a data collection tool in which written questions are presented that are to be answered by the respondents in written form.

A written questionnaire can be administered in different ways, for example by:

- Sending questionnaires by mail with clear instructions on how to answer the questions and asking for mailed responses;

- Gathering all or part of the respondents in one place at one time, giving oral or written instructions, and letting the respondents fill out the questionnaires; or

- Hand-delivering questionnaires to respondents and collecting them later.

The questions can be either open-ended or closed (with precategorized answers). (See Module 10B for details concerning design of interview schedules and questionnaires.)

Focus group discussions

See Module 10C for a discussion of this technique.

Additional data-collection techniques

Some additional techniques that may be useful for certain HSR projects are presented in Module 10D. These include:

- Nominal group technique,
- Delphi technique,
- Life histories,
- Scales,
- Essays,
- Case studies, and
- Mapping.

In addition, two general approaches that are used in certain HSR studies are discussed. These are:

- Rapid appraisal techniques or soundings, and
- Participatory research.

Please refer to Module 10D if you are considering using one or more of these techniques in your study.

Differentiation between data-collection techniques and data-collection tools

To avoid confusion in the use of terms, the following table points out the distinction between techniques and tools applied in data collection.

Table 10A.1. Data-collection techniques and tools.

Data-collection techniques	**Data-collection tools**
Using available information	Checklist, data-compilation forms
Observing	Eyes and other senses, pen and paper, watch, scales, microscope, etc.
Interviewing	Interview schedule, checklist, questionnaire, tape recorder
Administering written questionnaires	Questionnaire

Advantages and disadvantages of various data-collection techniques

The following table summarizes the advantages and disadvantages of various data collection techniques.

Table 10A.2. Advantages and disadvantages of various data-collection techniques.

Technique	Advantages	Disadvantages
Using available information	Inexpensive, because data are already there. Permits examination of past trends.	Data are not always easily accessible. Ethical issues concerning confidentiality may arise. Information may be imprecise or incomplete.
Observing	Gives more detailed and context-related information. Permits collection of informa-tion on facts not mentioned in the questionnaire. Permits tests of reliability of responses to questionnaires.	Ethical issues concerning confidentiality or privacy may arise. Observer bias may occur (observer may notice only what interests him or her). The presence of the data collector can influence the situation observed. Thorough training of research assistants is required.
Interviewing	Suitable for use with illiterates. Permits clarification of questions. Higher response rate than written questionnaires.	The presence of the interviewer can influence responses. Reports of events may be less complete than information gained through observations.
Small-scale flexible interview	Permits collection of in-depth information and exploration of spontaneous remarks by respondents.	The interviewer may inadvertently influence the respondents. Open-ended data are difficult to analyze.
Larger-scale fixed interview	Easy to analyze.	Important information may be missed because spontaneous remarks by respondents are usually not recorded or explored.
Administering written questionnaires	Less expensive. Permits anonymity and may result in more honest responses. Does not require research assistants. Eliminates bias due to phrasing questions differently with different respondents.	Cannot be used with illiterate respondents. There is often a low rate of response. Questions may be misunderstood.

II. IMPORTANCE OF COMBINING DIFFERENT DATA-COLLECTION TECHNIQUES

When discussing different data-collection techniques and their advantages and disadvantages, it becomes clear that they can complement each other. A skillful use of a combination of different techniques can maximize the quality of the data collected and reduce the chance of bias (see below).

Researchers often use a combination of flexible and less flexible research techniques.

Flexible techniques, such as

- loosely structured interviews using open-ended questions,
- focus group discussions, and
- participant observation

are also called QUALITATIVE research techniques. They produce qualitative information, which is often recorded in narrative form.

QUALITATIVE RESEARCH TECHNIQUES involve the identification and exploration of a number of often related variables that give INSIGHT into the nature and causes of certain problems and into the consequences of the problems for those affected.

Structured questionnaires that enable the researcher to quantify pre- or post-categorized answers to questions are an example of QUANTITATIVE research techniques. The answers to questions can be counted and expressed numerically.

QUANTITATIVE RESEARCH TECHNIQUES are used to QUANTIFY the size, distribution, and association of certain variables in a study population.

Both qualitative and quantitative research techniques are often used within a single study.

For example

It has been observed in country X that children between 1 and 2½ years, who have already started to eat independently, have unsatisfactory food intake once they fall ill. A study could be designed to address this problem, containing the following stages:

- Focus group discussions (FGDs) with 2 to 5 groups of mothers or in-depth interviews with 10 mothers to find out whether they change how they feed children in this age group during different illnesses and how they deal with children who have no appetite when they are sick (exploratory study);

- A cross-sectional survey, testing the relevant findings of the exploratory study on a larger scale;

- FGDs with women in the study area to discuss findings and possible questions arising from the survey and to develop possible solutions for problems detected.

In this example, the first, qualitative part of the study would be used to focus the survey on the most relevant issues and to help phrase the questions in an optimal way to obtain the information that is needed.

The second, quantitative part of the study would be used to find out what percentages of the mothers follow various practices, the reasons for their behaviour, and whether certain categories of children (e.g., the younger ones or children from specific socioeconomic categories) are more at risk than others.

The third, qualitative part of the study would provide feedback on the major findings of the survey. Do the conclusions make sense to women in the study area? Have certain aspects been overlooked when interpreting the data? What remedial action is feasible to improve the feeding practices of sick children?

It is also common to collect both qualitative and quantitative data in a single questionnaire. Researchers collecting both types of data have to take care that they:

- Do not include too many open-ended questions in large-scale surveys, making data analysis difficult; and
- Do not use inappropriate statistical tests on quantitative data generated by small-scale studies.

III. BIAS IN INFORMATION COLLECTION

BIAS in information collection is a distortion that results in the information not being representative of the true situation.

Possible sources of bias during data collection

1. Defective instruments

- Questionnaires with:
    - Fixed or closed questions on topics about which too little is known;
    - Open-ended questions without guidelines on how to ask (or to answer) them;
    - Vaguely phrased questions; or
    - Questions placed in an illogical order.
- Weighing scales that are not standardized.

These sources of bias can be prevented by **carefully planning the data-collection process** and by **pretesting the data-collection tools.**

2. Observer bias

Observer bias can easily occur during observation or loosely structured group or individual interviews. There is a risk that the data collector will see or hear only things in which he or she is interested or will miss information that is critical to the research. Observation protocols and guidelines for conducting loosely structured interviews should be prepared, and training and practice should be provided to data collectors in using both these tools. Moreover, it is highly recommended that data collectors work in pairs when using flexible research techniques and discuss and interpret the data immediately after collecting it.

3. Effect of the interview on the informant

This is a possible factor in all interview situations. The informant may mistrust the intention of the interview and dodge certain questions or give misleading answers. Such bias can be reduced by adequately introducing the purpose of the study to informants, by taking sufficient time for the interview, and by assuring informants that the data collected will be confidential.

It is also important to be careful in the selection of interviewers. In a study soliciting the reasons for the low utilization of local health services, for example, one should not ask health workers from the health centres concerned to interview the population. Their use as interviewers would certainly influence the results of the study.

Note:

By being aware of these potential biases, it is possible, to a certain extent, to prevent them. If the researcher does not fully succeed, it is important to report honestly in what ways the data may be biased.

IV. ETHICAL CONSIDERATIONS

As we develop our data-collection techniques, we need to consider whether our research procedures are likely to cause any physical or emotional harm. Harm may be caused, for example, by:

- Violating informants' right to privacy by posing sensitive questions or by gaining access to records that may contain personal data;
- Observing the behaviour or informants without their being aware; or
- Failing to observe or respect certain cultural values, traditions, or taboos.

Several methods for dealing with these issues may be recommended:

- Obtaining **informed** consent before the study or interview begins;

- Not exploring sensitive issues before a good relationship has been established with the informant; and

- Ensuring the confidentiality of the data obtained.

If sensitive questions are asked, for example about family planning practices, it may be advisable to omit names and addresses from the questionnaires.

EXERCISE: Selection of study types and data-collection techniques

(in plenary)

Five health-management problems for which studies must be developed are described below. For each problem you are asked to state:

- What type(s) of study you would propose,
- From whom (or from what) you would collect the data required for each study, and
- What data collection techniques you would use.

1. You noticed a number of women with goitre in your district and you are concerned that goitre might be a public-health problem. Therefore, you wish to find out the size of the problem. Furthermore you would like to find out whether the population perceives goitre as a problem. Finally you would like to identify the most important risk factors for goitre in your district.

2. A district health team evaluated its malaria spraying program by looking at available records and reports and did not find significant flaws in the functioning of the services in different divisions and villages. Nevertheless, the incidence of malaria and mosquito counts show peaks in certain villages that are most likely related to differences in quality of the malaria spraying services. You want to find out if there is something wrong with the services.

3. You are a midwife in charge of a maternity unit in a district hospital. You suspect that the number of low birth-weight babies is increasing and you would like to know more about the physical and socioeconomic conditions of the mothers to see if remedial action can be taken. The clinic records are at present not complete enough to draw conclusions and you have neither the time nor the money to do a large community survey.

4. You have recently been appointed to be the district nursing officer in a remote, previously underserved district. One of your tasks is to develop a district health plan. You want to collect information that will assist you in developing your plan.

5. There are long queues (waiting times), at the out-patient department of your district hospital. You are concerned about this and you would like to find out to what extent the problem may be related to the organization and management of the department and whether certain bottlenecks can be identified. In a later stage of the research you would like to try to eliminate some of the bottlenecks and see whether there is improvement.

GROUP WORK: Selection of study type and data-collection techniques

1. Decide what type(s) of study you will apply in your own research proposal.

   - Make your choice on the basis of your research objectives and the variables you would like to include in the study. (Hang them on a wall or flip chart board so the whole group can see them during this session.) Review pages 4-5 of Module 9, to assist you in your choice of study type(s).

2. Determine what data-collection techniques you will use for each variable in your study.

   - Display the table that was prepared during the group work on selection of variables. For each variable, determine the source of data and method(s) of data collection.

   - For some variables, it may be necessary to collect additional data to define the variable and determine the scale of measurement.

   Example: Factor: Inadequate knowledge of patient about diabetic diet
   Variable: Knowledge of patients
   Indicator: Percentage or number of items of advice that are recounted by patients

   To determine the "items" that should be used for the indicator, it may be necessary to do a focus group discussion (FGD) with the staff in the diabetic clinic and/or with a panel of experts on diabetes to determine what patients are (or should be) told and how. Subsequently, the results of the FGD could be used to develop questionnaires for interviews with patients. Hence, the methods of data collection would be FGD (to develop the indicators) and face-to-face interviews with patients.

   - Display the results in the following table:

Variable*	Indicators* (if needed)	Definitions* (if applicable)	Data-collection technique	Source of data

   * These items were developed during the group work session for Module 8.

   - Preserve this table for presentation in plenary and for use in subsequent group work.

3. Summarize which data-collection techniques you will use and which groups or records will form the sources of your data for each tool.

4. Decide whether there are any ethical problems with the type of study or data-collection tools you propose.

Module 10A: OVERVIEW OF DATA-COLLECTION TECHNIQUES

Timing and teaching methods

1 hour	Introduction to data-collection techniques and discussion
1 hour	Exercise: Selection of study types and data-collection techniques
1 hour	Group work: Selection of study types and data-collection techniques
1 hour	Plenary
4 hours	TOTAL TIME

Introduction and discussion

- Present an overview of the various data-collection techniques. Give examples from the participants' fields of interest.

  If it would be useful for the participants' research projects, you can introduce additional research techniques using the material in Modules 10C (Focus group discussions) and 10D (Other data-collection techniques) or other sources.

- Explain the difference between data-collection techniques and data-collection tools.

- Let the participants mention possible advantages and disadvantages of the various data-collection techniques.

- Explain at what times qualitative research techniques are most useful and when quantitative techniques are more appropriate. Make sure that participants understand the advantages of combining quantitative and qualitative research techniques, preferably giving examples from one or more of the projects they are developing.

- Identify different possibilities for bias, using examples from the participants' own studies.

- Let the groups come up with examples of ethical issues that might play a role in their studies.

Exercise: Selection of study types and data-collection techniques

- This exercise is designed to give participants some experience in choosing types of studies appropriate for typical situations before they have to select types of studies for their own proposals.

- Stress that objectives, if well formulated, should help to determine the appropriate study type(s).

- Ask participants to divide into subgroups of 4-5 persons to do the exercise. Each subgroup should be assigned two topics. Allow 15 minutes for the groups to complete their work.

- In the plenary, ask each group to answer the questions posed for one topic. Write the answers on a flip chart or overhead transparency, and let other groups who discussed the same topic comment and add their own suggestions.

(An answer sheet for the exercise is presented in Annex 10A.1, on the next page.)

Group work: Selection of study type and data-collection techniques

- This group work session is an important one, as it combines both the selection of study type and choice of data-collection techniques. Work closely with your group, helping them to go step by step through the process described for the group work.

- Make sure they understand why it is important to refer back to their variables and the table they developed during Module 8, as they choose the data-collection techniques they need.

Annex 10A.1. Answer sheet for exercise on selection of study types and data-collection techniques.

Proposed types of study	Proposed data-collection techniques
Topic 1 (goitre)	
Cross-sectional survey to determine the size of the problem	Clinical investigation (observation)
Case-control study to determine risk factors (cases and healthy controls to be selected from the cross-sectional survey)	Questionnaire on dietary habits and perception of goitre to be administered to cases and controls
Separate exploratory study first (if you have little idea about diet and perceptions of goitre)	FGD
Topic 2 (malaria spraying)	
Exploratory study	Participant observation (concealed)
A number of observers receive a short training course in spraying procedures and mix among the spraying teams. They find out that the sprayers dump most of the insecticide in the morning, so that their load is lighter in the afternoon. The villages sprayed in the afternoon are underserved. (Foster G.M. 1987. World Health Organization behavioural science research: problems and prospects. *Social Science and Medicine*, 24, 709-717.)	
Topic 3 (low birth-weight babies)	
Cohort study, examining all mothers who come for antenatal care over, say 6 months, and following them up until after they deliver.	Thorough history taking; measuring mothers' body-mass index (W/H^2) and growth during pregnancy; laboratory tests on hemoglobin, sugar, protein, blood smear for malaria; request to mothers who deliver at home to have babies weighed and examined 1 week after birth (if they do not show up for examination, follow up). Interviews with all the mothers on socioeconomic factors
Comparative (case control) study (mothers with low birth-weight babies and mothers with babies of normal weight)	Interviews with mothers who gave birth to low birth-weight babies and a control group of mothers who gave birth to babies of normal weight, concerning socioeconomic factors

Proposed types of study	**Proposed data-collection techniques**
Topic 4 (district health plan)	
Exploratory study	FGDs in villages to establish their needs
	Analysis of existing records and annual reports
	Interviews with health staff about needs and resources
	Observation of equipment available in clinics
Topic 5 (long waiting times at out-patient department in district hospital)	
Descriptive study	Observation of out-patient department procedures
or (better): Quasiexperimental (before-after) study	Interviews with staff on causes and solutions
	Interviews with patients
	Same as above, but before **and** after you have taken steps to improve the situation

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Module 10B:

DESIGN OF INTERVIEW SCHEDULES AND QUESTIONNAIRES

Steps in the development of an HSR proposal

Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data-collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 10B: DESIGN OF INTERVIEW SCHEDULES AND QUESTIONNAIRES

OBJECTIVES

At the end of this session, you should be able to:

1. Distinguish between various stages in questionnaire design.
2. Demonstrate appropriate techniques for wording questions and designing questionnaires to ensure maximum quality of responses.
3. Identify appropriate data-collection techniques for your study.
4. Prepare your data-collection tools, taking care that you cover all important variables.

I. Introduction

II. Types of questions

III. Steps in designing a questionnaire

   1. **Content**
   2. **Formulating questions**
   3. **Sequencing questions**
   4. **Formatting the questionnaire**
   5. **Translation**

I. INTRODUCTION

Interviews and self-administered questionnaires are probably the most commonly used research techniques. Therefore, designing good "questioning tools" forms an important and time-consuming phase in the development of most research proposals.

Once the decision has been made to use these techniques, the following questions should be considered before designing our tools:

- What exactly do we want to know, according to the objectives and variables we identified earlier? Is questioning the right technique to obtain all answers, or do we need additional techniques, such as observations or analysis of records?

- Of whom will we ask questions and what techniques will we use? Do we understand the topic sufficiently to design a questionnaire, or do we need some loosely structured interviews with key informants or a FGD first to orientate ourselves?

- Are our informants mainly literate or illiterate? If illiterate, the use of self-administered questionnaires is not an option.

- How large is the sample that will be interviewed? Studies with many respondents often use shorter, highly structured questionnaires, whereas smaller studies allow more flexibility and may use questionnaires with a number of open-ended questions.

II. TYPES OF QUESTIONS

Before examining the steps in designing a questionnaire, we need to review the types of questions used in questionnaires. Depending on how questions are asked and recorded we can distinguish two major possibilities:

- open-ended questions, and
- closed questions.

Open-ended questions

OPEN-ENDED QUESTIONS permit free responses that should be recorded in the respondent's own words. The respondent is not given any possible answers to choose from.

Such questions are useful to obtain information on:

- Facts with which the researcher is not very familiar,
- Opinions, attitudes, and suggestions of informants, or
- Sensitive issues.

For example

"Can you describe exactly what the traditional birth attendant did when your labour started?"

"What do you think are the reasons for a high drop-out rate of village health committee members?"

"What would you do if you noticed that your daughter (school girl) had a relationship with a teacher?"

Closed questions

CLOSED QUESTIONS offer a list of possible options or answers from which the respondents must choose.

When designing closed questions one should try to:

- Offer a list of options that are exhaustive and mutually exclusive, and
- Keep the number of options as few as possible.

Closed questions are useful if the range of possible responses is known.

For example

"What is your marital status?"
1. Single ○
2. Married/living together ○
3. Separated/divorced/widowed ○

"Have your ever gone to the local village health worker for treatment?
1. Yes ○
2. No ○

Closed questions may also be used if one is only interested in certain aspects of an issue and does not want to waste the time of the respondent and interviewer by obtaining more information than one needs.

For example, a researcher who is only interested in the protein content of a family diet may ask:

"Did you eat any of the following foods yesterday?" (circle yes or no for each set of items)

• Peas, bean, lentils	Yes	No
• Fish or meat	Yes	No
• Eggs	Yes	No
• Milk or cheese	Yes	No

Closed questions may be used as well to get the respondents to express their opinions by choosing rating points on a scale.

For example

"How useful would you say the activities of the Village Health Committee have been in the development of this village?"

1. Extremely useful ○
2. Very useful ○
3. Useful ○
4. Not very useful ○
5. Not useful at all ○

Using attitudes scales is advisable only in face-to-face interviews with literates if the various options for each answer are provided for the respondents on a card they can look at while making their choice. If the researcher only reads the options, the respondents might not consider all options equally and the scale will not accurately measure the attitudes.

Table 10B.1. Advantages and disadvantages of open-ended and closed questions and conditions for optimal use.

Open-ended questions	Closed questions
Advantages Issues not previously thought of when planning the study may be explored, thus providing valuable new insights into the problem. Information provided spontaneously is likely to be more valid than answers suggested in options from which the informant must choose. Information provided in the respondents' own words may be useful as examples or illustrations that add interest to the final report.	**Advantages** Answers can be recorded quickly. Analysis is easy.
Disadvantages Skilled interviewers are needed to get the discussion started and focused on relevant issues and to record all important information. Analysis is time-consuming and requires experience.	**Disadvantages** Closed questions are less suitable for face-to-face interviews with nonliterates. Respondents may choose options they would not have thought of themselves (leading questions → bias). Important information may be missed if it is not asked. The respondent and interviewer may lose interest after a number of closed questions.

Open-ended questions	Closed questions
Suggestions	**Suggestions**
Thoroughly train and supervise the interviewers or select experienced people.	Use closed questions only on issues that are simple.
Prepare a list of further questions to keep at hand to use to "probe" for answer(s) in a systematic way.	Pretest closed questions first as open-ended questions to see if your categories cover all possibilities.
Pretest open-ended questions and, if possible, pre-categorize the most common responses, leaving enough space for other answers.	Use closed questions in combination with open-ended questions.

In practice, **a questionnaire usually has a combination of open-ended and closed questions**, arranged in such a way that the discussion flows as naturally as possible.

In interviews questions are often asked as **open-ended questions**, but to facilitate recording and analysis, possible answers are to a large extent **pre-categorized**.

For example

"How did you become a member of the Village Health Committee?"

1. Volunteered ○
2. Elected at a community meeting ○
3. Nominated by community leaders ○
4. Nominated by the health staff ○
5. Other (specify): ○

____

____

With this type of half open-ended, half closed question strict guidelines have to be provided and followed!

- In general, such a question should be asked as an OPEN question: NO OPTIONS should be provided. Sometimes it may be useful to probe for an answer: then all interviewers should follow the same guidelines (for example, using the same types of probes).

  (If the question is asked in different ways by different interviewers, you get BIAS.)

- The interview guide or questionnaire should indicate whether the informant can give more than one answer to a question.

For open-ended questions, more than one answer is usually allowed. The interviewers will have to be trained to wait for additional answers. They should also be instructed not merely to tick the options mentioned, but to record any additional information a respondent may provide.

Note

Sometimes it is useful, especially in small-scale studies, to use pictures or drawings when asking certain questions to get the discussion going. In the case of illiterates, a questionnaire may even consist exclusively of pictures. (See Annex 10B.1.)

III. STEPS IN DESIGNING A QUESTIONNAIRE[1] [2]

Designing a good questionnaire always takes several drafts. In the first draft we should concentrate on the **content**. In the second, we should look critically at the **formulation and sequencing of the questions.** Then we should scrutinize the **format** of the questionnaire. Finally, we should do a **test-run** to check whether the questionnaire gives us the information we require and whether both we and the respondents feel at ease with it. Usually the questionnaire will need some further adaptation before we can use it for actual data collection.

Step 1: Content

Take your objectives and variables as your starting point.

Decide what questions will be needed to measure or to define your variables and reach your objectives.

When developing the questionnaire, you should reconsider the variables you have chosen, and, if necessary, add, drop or change some. You may even change some of your objectives at this stage.

Step 2: Formulating questions

Formulate one or more questions that will provide the information needed for each variable.

Take care that questions are specific and precise enough that different respondents do not interpret them differently. For example, a question such as: "Where do community members usually seek treatment when they are sick?" cannot be asked in such a general way because each respondent may have something different in mind when answering the question:

- One informant may think of measles with complications and say he goes to the hospital, another of cough and say he goes to the private pharmacy;
- Even if both think of the same disease, they may have different degrees of seriousness in mind and thus answer differently;
- In all cases, self-care may be overlooked.

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[1] For the sake of simplicity we take questionnaires as an example. The same steps apply to designing more loosely structured interview schedules and checklists.

[2] This section is largely adapted from Sudman Bradman (1983).

The question, therefore, as a rule has to be broken up into different parts and made so specific that all informants focus on the same thing. For example, one could:

- Concentrate on illness that has occurred in the family over the past 14 days and ask what has been done to treat it from the onset; or

- Concentrate on a number of diseases, ask whether they have occurred in the family over the past X months (chronic or serious diseases have a longer recall period than minor ailments) and what has been done to treat each of them from the onset.

Check whether each question measures one thing at a time.

For example, the question, "How large an interval would you and your husband prefer between two successive births?" would better be divided into two questions because husband and wife may have different opinions on the preferred interval.

Avoid leading questions.

A question is leading if it suggests a certain answer. **For example**, the question, "Do you agree that the district health team should visit each health centre monthly?" hardly leaves room for "no" or for other options. Better would be: "Do you think that district health teams should visit each health centre? If yes, how often?"

Sometimes, a question is leading because it presupposes a certain condition. **For example**: "What action did you take when your child had diarrhea the last time?" presupposes the child has had diarrhea. A better set of questions would be: "Has your child had diarrhea? If yes, when was the last time?" "Did you do anything to treat it? If yes, what?"

Formulate control questions to cross-check responses on "difficult" questions (sensitive questions or questions for which it is difficult to get a precise answer).

Avoid words with double or vaguely defined meanings and emotionally laden words. Concepts such as nasty (health staff), lazy (patients), or unhealthy (food), for example, should be omitted.

Step 3: Sequencing of questions

Design your interview schedule or questionnaire to be "consumer friendly."

- The sequence of questions must be logical for the respondent and allow as much as possible for a "natural" discussion, even in more structured interviews.

- At the beginning of the interview, keep questions concerning "background variables" (e.g., age, religion, education, marital status, or occupation) to a minimum. If possible, pose most or all of these questions later in the interview. (Respondents may be reluctant to provide "personal" information early in an interview and, if they become worried about confidentiality, be wary about giving their true opinions.)

- Start with an interesting but noncontroversial question (preferably open) that is directly related to the subject of the study. This type of beginning should help to raise the informants' interest and lessen suspicions concerning the purpose of the interview (e.g., that it will be used to provide information to use in levying taxes).
- Pose more sensitive questions as late as possible in the interview (e.g., questions pertaining to income, political matters, sexual behaviour, or diseases with stigma attached to them).
- Use **simple, everyday language.**

Make the questionnaire as short as possible. Conduct the interview in two parts if the nature of the topic requires a long questionnaire (more than 1 hour).

Step 4: Formatting the questionnaire

When you finalize your questionnaire, be sure that:

- Each questionnaire has a heading and space to insert the number, date, and location of the interview, and, if required, the name of the informant. You may add the name of the interviewer to facilitate quality control.
- Layout is such that questions belonging together appear together visually. If the questionnaire is long, you may use subheadings for groups of questions.
- Sufficient space is provided for answers to open-ended questions.
- Boxes for pre-categorized answers are placed in a consistent manner (e.g., on the right half of the page). (See examples in this module.)
- If you use a computer, the right margin of the page should be reserved for boxes intended for computer codes. (See Module 13 and consult an experienced facilitator when designing your questionnaire.)

Your questionnaire should not only be *consumer* but also *user friendly*!

Step 5: Translation

If interviews will be conducted in one or more local languages, the questionnaire has to be translated to standardize the way questions will be asked.

After having it translated you should have it retranslated into the original language. You can then compare the two versions for differences and make a decision concerning the final phrasing of difficult concepts.

GROUP WORK (4 hours or more)

1. Prepare your data-collection tools (instruments), taking care that you cover all important variables. Refer back to the table that your group prepared during the group work session at the end of Module 10A, which specifies the methods of data collection you must use. (You might divide up the work, assigning different members of the group to design the various data-collection instruments required.)

2. If a method is needed other than those presented in Modules 10A and 10B, refer to Module 10C or 10D or a research methodology text for any further information you may need.

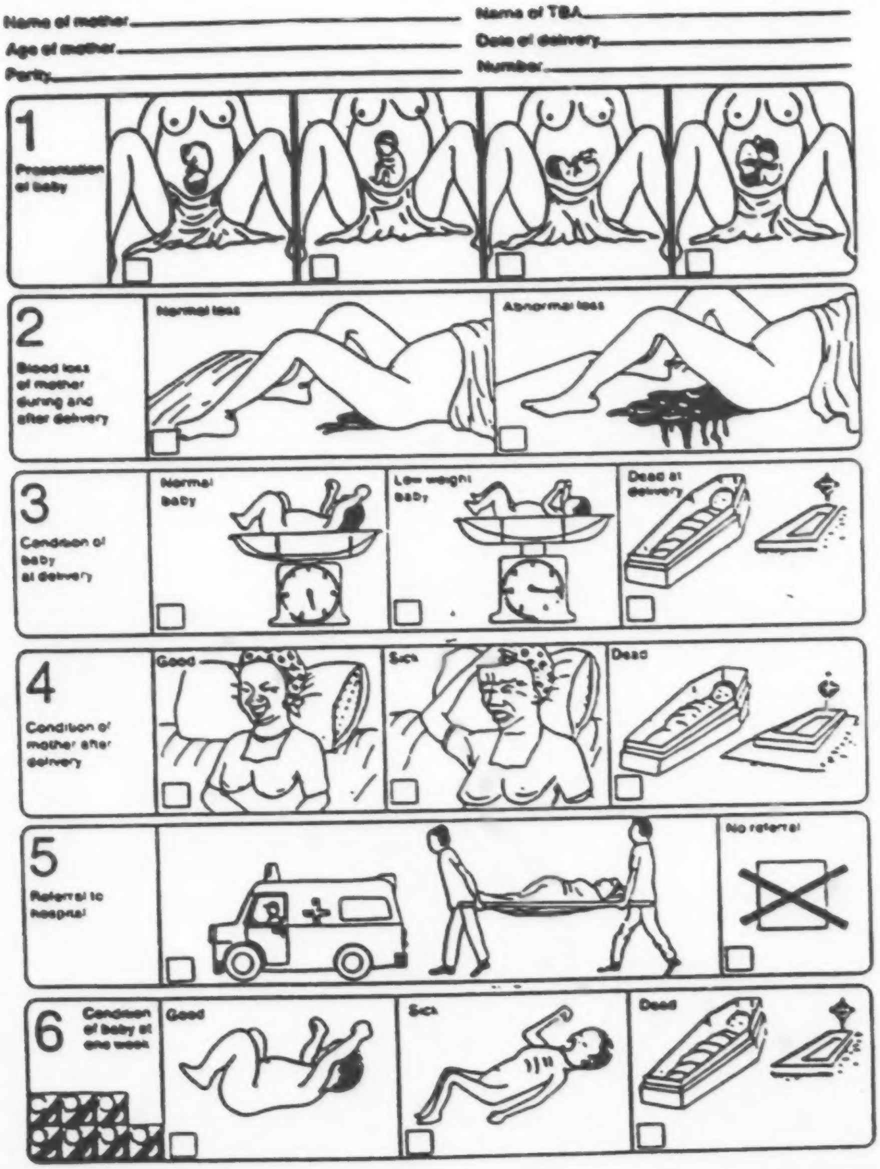
3. Discuss the possibility of bias that may occur when using the data-collection tools. Try to avoid bias as much as possible.

EXERCISE: Review of data-collection tools

1. Review in detail the data-collection tools of one other research team in relation to their objectives and variables and prepare suggestions for improving them. Be prepared to present your comments in plenary.

2. If there is time, review the data-collection tools of the other research teams in the course as well.

Annex 10B.1. Maternal record[3]



Name of mother____________________

Name of TBA____________________

Age of mother____________________

Date of delivery____________________

Parity____________________

Number____________________

1 Presentation of baby ☐ ☐ ☐ ☐

2 Blood loss of mother during and after delivery
☐ Normal loss
☐ Abnormal loss

3 Condition of baby at delivery
☐ Normal baby
☐ Low weight baby
☐ Dead at delivery

4 Condition of mother after delivery
☐ Good
☐ Sick
☐ Dead

5 Referral to hospital
☐
☐ No referral

6 Condition of baby at one week
☐ Good
☐ Sick
☐ Dead

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[3] This questionnaire, which was made for use by nonliterate health workers, was provided by Dr Peter Lamptey.

Module 10B: DESIGN OF INTERVIEW SCHEDULES AND QUESTIONNAIRES

Timing and teaching methods

1 hour	Introduction to design of questionnaires
4 hours+	Group work
2 hours	Exercise: Comment on the data-collection tools of other groups
2 hours	Plenary on data-collection tools
2 hours	Revision of data-collection tools
11 hours+	TOTAL TIME

Introduction and discussion

- The introduction should be straightforward but interactive, providing participants with an opportunity to comment on obviously poor questions and come up with suggestions for improvement.

- The handling of half open-ended/half closed questions that appear in many questionnaires may need special attention. Participants should be aware of the danger of bias if these questions are not asked uniformly as **open-ended** questions, unless guidelines are provided for probing for the various options.

- The formatting of questionnaires should be illustrated with an example.

Group work

- All facilitators should be aware that the quality of the data-collection tools determines the quality of the data with which the participants return from the field. Skillful guidance of the groups is, therefore, essential.

- If participants are relatively inexperienced in research, the first version of a questionnaire is often too general and has too many closed questions. It is extremely important that the groups try their questionnaires out before finalizing their proposal, either in a "real life" situation or on each other, so that they can check whether the information collected will be sufficiently specific to meet their research objectives. (See Module 14 for guidelines on pretesting.)

- The time needed to develop the data-collection tools may exceed 4 hours. Usually groups continue working in the evening. There should be two more opportunities in the program to revise the data-collection tools: after the exercise (see below) and after the pretest (see Module 14).

Exercise: Review of data-collection tools

- If possible, have all groups review and critique the data-collection tools of all other groups, with special attention to the tools of one group. In plenary, the group that has the primary responsibility for reviewing a particular group's tools should comment first. Then other groups should be asked to give any additional suggestions, after which the group whose tools have been discussed can reply, if necessary.
- When groups have many different data-collection tools (questionnaires, checklists, schedules for focus group discussion), it may not be possibly to discuss all tools in 2 hours. Then, two groups could swap their tools and discuss them in "mini-plenaries" of the two groups. Facilitators, however, should read and comment on the data-collection tools of all groups.

Note

When groups are preparing their data-collection tools they should have an idea which tools they would like to pretest and where. At this time, **the course management team should start organizing the pretest.**

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 10C:

FOCUS GROUP DISCUSSION

Steps in the development of an HSR proposal

Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data-collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	

N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 10C: FOCUS GROUP DISCUSSION

OBJECTIVES

At the end of the session, you should be able to:

1. Identify the purpose, uses, and limitations of the focus group discussion (FGD) as a method of data collection in research.
2. Conduct an FGD, analyze the data, and report on the results.

I. Characteristics and uses of focus group discussions

II. How to conduct a focus group discussion

III. Analysis of results

IV. Report writing

I. CHARACTERISTICS AND USES OF FOCUS GROUP DISCUSSIONS

A FOCUS GROUP DISCUSSION (FGD) is a group discussion of 6-12 persons guided by a facilitator, during which group members talk freely and spontaneously about a certain topic.

The purpose of an FGD is to obtain in-depth information on concepts, perceptions, and ideas of the group. An FGD aims to be more than a question-answer interaction. The idea is that group members discuss the topic among themselves.

FGD techniques can be used to:

1. Focus research and develop relevant research hypotheses by exploring in greater depth the problem to be investigated and its possible causes.

   Example

   A district health officer had noticed that there were an unusually large number of cases of malnutrition in children under 5 reported from one large village in her district. Because she had little idea of why there might be more malnutrition in this village, she decided to organize three focus groups (one of leaders, one of mothers from the village, and one of the health staff assigned to do home visits in that village). She hoped to identify potential causes of the problem through the focus groups and then develop a more intensive study, if necessary.

2. Formulate appropriate questions for more structured, larger-scale surveys.

   Example

   In planning a study on incidence of childhood diarrhea and feeding practices, an FGD showed that in the community under study, children below the age of 1 year were not perceived as having "bouts of diarrhea," but merely "having loose stools" that were associated with milestones such as sitting up, crawling, and teething. In the questionnaire that was being developed the concept diarrhea was, therefore, carefully circumscribed, using the community's notions.

3. Supplement information on community knowledge, beliefs, attitudes, and behaviour already available but incomplete or unclear.

   Example

   There is a high drop-out rate in child welfare clinics among children over the age of 6 months. A previous survey indicates that mothers give reasons such as "too busy," "have other domestic commitments," or "experience transport problems." Because these same mothers have previously brought their infants under 6 months of age regularly, you suspect that there are other factors. A **focus group discussion** with a few groups of mothers could provide in-depth information on the reasons for the changes in their perceptions and behaviour regarding the use of the clinic for children over 6 months old.

4. Develop appropriate messages for health-education programs.

Example

A rural health clinic wanted to develop a health-education program focused on weaning problems most often encountered by mothers in the surrounding villages and what to do about them. An FGD could be used for exploring relevant local concepts as well as for testing drafts when developing the messages.

5. Explore controversial topics.

Example

In a household survey, it appeared that male informants most frequently said that their wives kept the household money, whereas female informants maintained their husbands kept the money. An FGD with a group of females and a separate one with a group of males may bring forward the complicated patterns and variations of financial responsibility in the domestic group. It may be interesting to have a third session of males and females together to discuss the differences in perception.

FGDs are not used to test hypotheses or to produce research findings that can be generalized.

II. HOW TO CONDUCT A FOCUS GROUP DISCUSSION

Preparation

Recruitment of participants:

Participants should be roughly of the same socioeconomic group or have a similar background in relation to the issue under investigation. The age and sexual composition of the group should facilitate free discussion.

If you need to obtain information on a topic from several different categories of informants who are likely to discuss the issue from different perspectives, you should organize a focus group for each major category. For example:

- A group for men and a group for women, or
- A group for older women and a group for younger women.

It may be interesting to have an additional discussion in which the groups are confronted with each other's opinions.

Participants should be invited at least 1 or 2 days in advance, and the general purpose of the FGD should be explained.

Physical arrangements

Communication and interaction during the FGD should be encouraged in every way possible. Arrange the chairs in a circle. Make sure the area will be quiet, adequately lighted, etc., and that there will be no disturbances. Try to hold the FGD in a neutral setting that encourages participants to freely express their views. A health centre, for example, is not a good place to discuss traditional medical beliefs or preferences for other types of treatment.

Preparation of a discussion guide

There should be a **written** list of topics to be covered. It can be formulated as a series of open-ended questions. Guides for different groups gathered to discuss the same subject may vary slightly, depending on their knowledge or attitudes and how the subject can first be explored with them. (See example of two guides for two different groups in Annex 1.)

Conducting the session

One of the members of the research team should act as "facilitator" for the focus group. One should serve as "recorder."

Functions of the facilitator

The facilitator should **not** act as an expert on the topic. His or her role is to stimulate and support discussion.

- **Introduce the session**

  Introduce yourself as facilitator and introduce the recorder. Introduce the participants by name or ask them to introduce themselves. Put the participants at ease and explain the purpose of the FGD, the kind of information needed, and how the information will be used (for the planning of a health program, an education program, etc).

- **Encourage discussion**

  Be enthusiastic, lively, and humorous and show your interest in the group's ideas. Formulate questions and encourage as many participants as possible to express their views. Remember there are **no** "right" or "wrong" answers. **React neutrally** to both verbal and nonverbal responses.

- **Encourage involvement**

  Avoid a question-and-answer session. Some useful techniques include:

  - Asking for clarification: "Can you tell me more about...?"

- Reorienting the discussion when it goes off the track:
    Saying: "Wait, how does this relate to...?"
    Saying: "Interesting point, but how about...?"
    Using one participant's remark to direct a question to another, for example, "Mrs. X said...., but how about you, Mrs Y?"
- When dealing with a dominant participant, avoiding eye contact or turning slightly away to discourage the person from speaking, or thanking the person and changing the subject.
- When dealing with a reluctant participant, using the person's name, requesting his opinion, making more frequent eye contact to encourage his participation.

- **Build rapport, empathize**

  Observe nonverbal communication. Ask yourself, "What are they saying? What does it mean to them?" Be aware of your own tone of voice, facial expressions, body language, and those of the participants.

- **Avoid being placed in the role of expert**

  When you are asked for **your** ideas or views by a respondent, remember that you are not there to educate or inform. Direct the questions back to the group by saying: "What do you think?" "What would you do?" Set aside time, if necessary, after the session to give participants the information they have asked for.

  Do not try to comment on everything that is being said. Do not feel you have to say something during every pause in the discussion. Wait a little and see what happens.

- **Control the rhythm of the meeting, but in an unobtrusive way**

  Listen carefully and move the discussion from topic to topic. Subtly control the time allocated to various topics so as to maintain interest. If participants spontaneously jump from one topic to the other, let the discussion continue for a while because useful additional information may surface and then summarize the points brought up and reorient the discussion.

- **Take time at the end of the meeting to summarize, check for agreement and thank the participants**

  Summarize the main issues brought up, check whether all agree and ask for additional comments. Thank the participants and let them know that their ideas have been a valuable contribution and will be used for planning the proposed research/intervention/health education materials.

  Listen for **additional comments** made after the meeting has been closed.

Functions of the recorder

The recorder should keep a record of the content of the discussion as well as emotional reactions and important aspects of group interaction. Assessment of the emotional tone of the meeting and the group process will enable you to judge the validity of the information collected during the FGD.

Items to be recorded include:

- Date, time, and place;
- Names and characteristics of participants;
- General description of the group dynamics (level of participation, presence of a dominant participant, level of interest);
- Opinions of participants, recorded as much as possible in their own words, especially for key statements;
- Emotional aspects (e.g., reluctance, strong feelings attached to certain opinions); and
- Vocabulary used - particularly in FGDs that are intended to assist in developing questionnaires or health-education materials

It is highly recommended that a tape recorder be used to assist in capturing information. Even if a tape recorder is used, notes should be taken as well, in case the machine malfunctions and so that information will be available immediately after the session.

A **supplementary role** for the recorder could be to assist the facilitator (if necessary) by drawing his or her attention to:

- Missed comments from participants, and
- Missed topics (the recorder should have a copy of the discussion guide during the FGD).

If necessary, the recorder could also help resolve conflict situations that the facilitator is having difficulty handling.

Number and duration of sessions

Number of sessions

The number of focus group sessions to be conducted depends upon project needs, resources, and whether new information is still coming from the sessions (that is, whether contrasting views from various groups in the community are still emerging).

One should plan to conduct at least two different FGDs for each subgroup (for example, two for males and two for females).

Duration

A focus group session typically lasts up to an hour and a half. Generally the first session with a particular type of group is longer than the following ones because all of the information is new. Thereafter, if it becomes clear that all the groups have the same opinion on particular topics, the facilitator may be able to move the discussion along more quickly to other topics that still elicit new points of view.

III. ANALYSIS OF RESULTS

- After each focus group session, the facilitator and recorder should meet to review and complete the notes taken during the meeting. This is also the right moment to evaluate how the focus group went and what changes might be made when facilitating future groups.

- Then a full report of the discussion should be prepared that reflects the discussion as completely as possible, using the participants' own words. List the key statements, ideas, and attitudes expressed for each topic of discussion.

- After the transcript of the discussion is prepared, code the statements right away, using the left margin. Write comments in the right margin. Formulate additional questions if certain issues are still unclear or controversial and include them in the next FGD.

- Further categorize the statements for each topic, if required. Compare answers of different subgroups (e.g., answers of young mothers and answers of mothers above child-bearing age in the FGD on changes in weaning practices).

  The findings should be coherent. For example, if young women in all FGDs state that they start weaning some 3-6 months earlier than their mothers did and the women above child bearing age confirm this statement, one likely has a solid finding. If findings contradict each other, one may need to conduct some more FGDs or bring together representatives from two different subgroups to discuss and clarify the differences.

- Summarize the date in a matrix, diagram, flowchart, or narrative, if appropriate, and interpret the findings. (See Module 24.)

- Select the most useful quotations that emerged from the discussions to illustrate the main ideas.

IV. REPORT WRITING

Start with a description of the selection and composition of the groups of participants and a commentary on the group process, so the reader can assess the validity of the reported findings.

Present your findings, following your list of topics and guided by the objective(s) of your FGD. Include quotations whenever possible, particularly for key statements.

Examples of discussion guides for FGDs in a study of weaning practices among a group of young mothers (20-30 years of age) and a group of mothers above child-bearing age.

Young mothers	Mothers above child-bearing age
1. Differences between nutritional needs of a baby and an adult. • In type of food • In frequency of feeding (Try to let these distinctions come up spontaneously.)	1. Same questions as for young mothers.
2a. Age of baby at which mothers in general now start giving soft food in addition to breast milk.	2a. Age at which mothers started to give soft foods in addition to breast milk (when they had their first child).
b. What type of foods? How often prepared? How prepared?	b. What type of food? How often prepared? How prepared?
3a. Try to get from each mother the age at which she started to add soft foods to the diet of the child she most recently weaned.	3a. Try to get from each mother the age at which she started to add soft foods to the diet of her first born.
b. If a mother deviated from the "norm," why?	b. If a mother deviated from the "norm," why?
4. Would it be possible to generalize about reasons why some mothers start weaning early and some start weaning late nowadays?	4. Would it be possible to generalize about reasons why, 30 years ago (when they had their first children), some mothers started weaning early and why others started late?
5a. If they compare their own weaning practices (adding soft foods) to those of older women, do they notice any difference? Specify.	5a. If they compare their own weaning practices (adding soft foods) to those of their daughters (or other young women) do they notice any differences? Specify.
b. Opinion on those differences.	b. Opinion on those differences.
6. Age at which mothers in general nowadays start to add solid foods to the baby's diet. What type of foods? Family meal or specially prepared? How often? What if the child is already asleep at the evening meal, etc.	6. Age at which mothers 30 years ago (when they themselves had their first children) started to add solid foods to the baby's diet. What type of foods? Family meal or specially prepared? How often? What if the child is already asleep at the evening meal, etc.

EXERCISE (3 hours total)

Conducting an FGD (75 minutes)

Participants working in groups of 6-12 conduct an FGD among themselves.

- Preparation of discussion guides (15 minutes), and
- Discussion (60 minutes).

Analysis of data (30 minutes)

The reporter and chairperson analyze the notes and prepare the report.

Plenary (75 minutes)

The plenary sessions may include the following steps for each group:

1. The recorder presents the report of the FGD of his or her group.
2. Recorders can then ask for comments and reactions from members of the group.
3. Workshop facilitators can comment on the group process.
4. If different groups discussed the same topic, the plenary can try to identify the different perspectives from which each group approached the topic.
5. A discussion can be held concerning the effects of the role played by the facilitator, the group process, and the skills of the recorder on the validity of the report of the FGD.

Module 10C: FOCUS GROUP DISCUSSIONS

Timing and teaching methods

½ hour	Presentation on FGD
3 hours	Exercise: focus group discussions
3 ½ hours	TOTAL TIME

Introduction and discussion

- Start with a 30-minute presentation on FGDs;
- Present a sample:
    - Guide for an FGD and
    - Report of an FGD.

Exercise: Focus group discussion

- Prepare for the exercise by placing the participants in homogeneous groups of 6-10 persons, for example two groups of males and one group of females. Try to select a topic on which males and females might react differently (for example: the most efficient way to propagate condom use as a means to prevent AIDS; target groups; possible effects).

  or: place the participants in three homogeneous groups of 5-10 persons (not necessarily according to sex) and give each of them a different, controversial discussion topic.

- Instruct the groups on preparation of discussion guides (15 minutes). Inform each group of their assigned topic.

  Request each member to develop a written guide for the discussion. (Note: This part of the exercise should enable all participants to develop skill in writing a guide.)

- Instruct the group to appoint an FGD facilitator and recorder. The guide developed by the participant selected to be facilitator will be the guide used for the FGD exercise. Allow 1 hour for the FGD.

- During the FGD, one of the workshop trainers or workshop facilitators should be assigned to observe each group.

- The workshop trainer/facilitator should observe and record the group process. It is useful to record the interaction (i.e., who talks, to whom) and the time frame as well as the process, that is,
    - The skills and limitations displayed by the facilitator;
    - The behaviour of group members; and
    - The influence of the group interaction on the development of the discussion topic.
- During the plenary, invite the participants to comment on the extent to which the recorder's report reflects their own opinions and feelings. This will help them appreciate the potential and limitations of an FGD and also the crucial role of the facilitator and recorder of an FGD.

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 10D:

OTHER DATA-COLLECTION TECHNIQUES

Steps in the development of an HSR proposal

Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data-collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	

N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 10D: OTHER DATA-COLLECTION TECHNIQUES[1]

OBJECTIVES

By the end of this session, you should be able to:

1. Describe additional data-collection techniques and approaches that could be used in selected studies, including:
   - Nominal group technique,
   - Delphi technique,
   - Scales,
   - Essays,
   - Case studies,
   - Rapid appraisal techniques or soundings,
   - Participatory research.
2. Use any of these techniques that may be appropriate in the research project you are developing.

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[1] The information in this module is adapted from Module 4, Some techniques and methods to facilitate the research process in health systems research, in *Volume 4: Managing Research* of this HSR training series.

Nominal group technique

The nominal group technique (NGT) is a group discussion technique that is useful when one wants to obtain a consensus from a group on a topic where decision-making can be usefully guided by the perceptions and opinions of the various group members. The sequence of the group discussion is usually individual expression followed by "voting," followed by further discussion and another round of discussion, voting, etc. The group discussion comes to an end when the results of the last vote are not appreciably different from the last-but-one vote.

Steps in applying the nominal group technique[2]

Participants (8-10, all familiar with the content area being explored) are assembled in a quiet room. They are seated in U-shaped setting so that all participants can see the display (board, flip chart, or overhead). The moderator is a nonparticipant who explains and then guides the participants through the process. The steps of the NGT process are summarized below:

1. **Individual listing of ideas on paper.**

   The NGT statement or question is read and the participants are requested to list their ideas (limited to 5 or 10) on a sheet of paper. This is done in complete silence to prevent the group from becoming judgmental about the ideas too soon. The sheets are collected.

2. **Display of lists produced, followed by discussion.**

   The moderator takes each sheet of paper and displays each idea on the board so that it is seen by all members. The leader requests the member to briefly state the idea and why it is important as it is being displayed. Ideas that pertain to the same topic are grouped. The participants can be asked to help develop the classification system to be used.

   No comments are made by the group at this time, but as the ideas are presented the rest of the group should study them and see whether they understand what the ideas are and why they are important. If clarification is needed, this is done after all ideas are recorded.

3. **Voting and ranking.**

   After the ideas are clarified, the moderator asks the participants to select a certain number of ideas on the display (for example, five) that they consider most important, write them on a sheet of paper, and rate them. The rating system used can vary, but should be fixed in advance: for instance, 5 for the most important idea, 4 for the next most important, etc. The sheets of paper are then collected.

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[2] Some of the ideas in this process are adapted from Williamson J.W. et al. 1981. Health accounting for quality assurance. American Occupational Therapy Association.

4. **Summarizing the results.**

   The moderator writes each individual rating on the display, next to the idea. All rates are added, resulting in a total score for each idea. The ideas are then ranked, according to the score they received.

5. **Discussion of the results.**

   The results of the first vote are discussed in plenary. All members are urged to contribute. The group leader may wish to select two types of ideas for review: those with high votes and those with divergent votes (i.e. very high and very low weights). A few new ideas may be developed in this discussion, and, if so, an initial rating should be done for these ideas before a full discussion. Also, it may be possible to identify a few "sleeper" ideas among those given low votes. Sometimes such ideas may get a high vote when group members understand why the participant suggested the idea.

6. **Second vote and reranking.**

   Participants are asked to vote a second time and the whole process of ranking and discussion is repeated. Voting stops when the results from two consecutive votes do not yield a marked difference. The ranking of the revised final scores gives the order of importance of the ideas as perceived by the group.

Advantages of the NGT

- The discussion process is strictly separated from the voting process and voting is done anonymously. This depersonalizes the process and gives each member an equal vote, regardless of his verbal capacities.

- The results thus reflect input from all members of the group. The series of discussions and anonymous votes helps to minimize the chance that the results will be skewed toward the opinions of one or more dominant personalities.

- It provides a useful means of aggregating individual judgments.

Examples of the uses of NGT in health systems research

The NGT (or a modified version of the NGT) is particularly useful during the research process in health systems research to:

- assist a group of managers/researchers/community representatives in generating and prioritizing lists of topics for which research information may be needed;

- assist a group in selecting between alternate research topics, or

- provide input from a group of "experts" on one or more issues being explored during the research.

Delphi technique

The delphi technique and the nominal group technique have the same objective: both are used in a situation where a group needs to reach consensus over an issue that is highly value-laden. The major difference is that in the delphi technique, groups do not (usually) meet for discussion, they communicate by means of questionnaires. Each time a questionnaire circulates, the range of permissible answers is narrowed toward the average of the answers in the previous questionnaire. Because of the nature of the technique there must be ample time and participants must have good written communication skills.

Life histories

A special application of the interview technique is the use of life histories. This technique allows people to tell stories, which provides insight into what they consider important. Life-history taking is a special form of interviewing, usually conducted on a very limited sample (maximum 25). The technique fits well with the local communication pattern in rural traditional societies. Issues that are especially suited for investigation using the life-history approach include, for example, patterns of reproduction, and women's feelings about marriage, childbirth, and contraception.

Scales

Test batteries and scales are highly structured interviews: the sequence of the questions is set and highly standardized. It is often argued that, because of validity problems, these questionnaires are less useful in semi-literate, rural settings in developing countries. Scales are a tempting instrument for researchers exploring health behaviour, but should be developed only by researchers who are experienced in their constructions and know how to address the problems of validity and reliability that arise. Provided that both problems are solved, scales can be used in descriptive studies. Scales have been invented to measure complex concepts such as health, depression, neuroticism, fear, intelligence, etc. They are mainly used by psychologists and psychiatrists for diagnostic purposes. Some researchers have used scales within population surveys in an effort to describe and "diagnose" various community groups.

Essays

Some anthropologists have used school children's essays to explore the (hidden) values and aspirations of their subjects and the community they live in. Essays may be analyzed to determine differences in beliefs concerning perceived causes of illness, emic (lay) popular theories of illness causation, rationale for health-related behaviour, and the like.

Case studies

Case studies involve detailed investigations of a few people, a community, or a particular situation. Usually a number of methods for collecting information are used simultaneously. The subjects of the study are often chosen using nonprobability sampling. For example, the cases may be selected in such a way that they are typical or illustrative of a particular phenomenon or group.

The units of study are few: in a community study, for instance, one or a few communities may be studied. A detailed activity study may be focused on the tasks and functions of a specific group of people.

Mapping

Mapping is a valuable technique for visually displaying relationships and resources.

> In a water supply project, **for example**, mapping is invaluable. It can be used to represent the location of wells, distance of the living areas from the wells, other water systems, etc. It gives researchers a good overview of the physical situation and may help to highlight relationships hitherto unrecognized.

Mapping is also very useful and often indispensable as a pre-stage to sampling.

Rapid appraisal techniques or soundings

In health systems research it is often necessary to obtain information rapidly and economically, even if that means that the information will lose a degree of precision. Rapid appraisal techniques can be used if existing data are not sufficient to identify and describe a health problem. They can be used to obtain additional information in an easy, quick, inexpensive, but inevitably less accurate way than through the use of an orthodox survey.

> **For example**, if a health team wishes to reduce maternal and infant mortality in a community where birth and death data are inadequate and resources and access to health care is limited, baseline data can be obtained through rapid assessment surveys or soundings. These surveys are retrospective and depend on the memories of key informants. For example, headmen, traditional birth attendants, health professionals, and the "influential women" can all be interviewed using simple check-lists or questionnaires that probe for information such as:
>
> - facts about events such as birth and maternal deaths;
> - information about the women who gave birth in the village (such as their age, parity, etc); and
> - information on the use of health care.
>
> In addition, clinic records can be systematically reviewed and compared with the information provided through the unstructured interviews. (Based on WHO, Workbook, 1984.)

Rapid appraisal techniques and soundings are especially useful in the pilot phase of research, in conjunction with participatory research, and when the accuracy of the data does not have to be very high.

Participatory research

The explicit idea in classical research is that somebody researches and someone else is researched. The idea that someone researches him- or herself is quite uncommon. A district medical officer may investigate the needs of his area, but this is not what is means by participatory research.

In participatory research the boundaries between research and health programs are blurred: through the implementation of the research it is expected that conditions influencing the health system will change. An essential aspect of participatory research is that all phases of the research (from setting the objectives to using the results) are planned and conducted by the researchers and target population together.

The results of participatory research should be useful to those who participated in the research.

> A good **example** of participatory research is a project organized in two rural regions of Kanetaka, India, in which community members were involved in a "community diagnosis" as a step toward developing a primary health care (PHC) program and promoting the community's involvement in it (Nichter 1984). The research team argued that the best way to conduct a community diagnosis was "with the people and for the people" as research, they charged, has been often misused by project managers to collect information only on issues of importance to them and designed in a way that would reflect results that fit their interests.
>
> Participatory research in the Indian villages involved setting up steering groups of interested villagers. Training lay persons in methods of health-behaviour research and then working with them to conduct a community diagnosis focused on understanding, among other things, local health problems and the lay health culture. The community investigators were involved in participant observation of a wide variety of health care settings, dialogues with a few key informants, and interviews with respondents in a sample of households. Based on the results, the researchers and community members involved were able to explore and develop approaches to health education. The research process itself enhanced community involvement in the development of an active PHC and health-education program.

Module 10D: OTHER DATA-COLLECTION TECHNIQUES

Timing and teaching methods

Can be assigned as reading for teams that may use the techniques, or presented as part of Module 10A (overview).

Introduction and discussion

This module contains information on additional data-collection techniques that may be useful to some groups. It is not meant to be formally presented, although the information on one or more of the techniques can be integrated into the presentation of Module 10A (Overview of data-collection techniques). If the material will not be presented, participants should be asked to read it. If any of the techniques presented will be particularly useful for one or more groups, and they have little knowledge of how to use it, an exercise involved the use of the technique can be devised (like that suggested for the focus group discussions in Module 10C).

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 11:

SAMPLING

Steps in the development of an HSR proposal

Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data-collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	

N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 11: SAMPLING

OBJECTIVES

At the end of this session, you should be able to:

1. **Identify and define** the population to be studied.
2. **Identify and describe** common methods of sampling.
3. **Discuss** problems of bias that should be avoided when selecting a sample.
4. **List** the factors to consider when deciding on sample size.
5. **Decide** on the sampling method and sample size most appropriate for the research design you are developing.

I. Introduction

II. Sampling methods

III. Bias in sampling

IV. Ethical considerations

V. Sample size

I. INTRODUCTION

What is sampling?

SAMPLING involves the selection of a number of study units from a defined study population.

Some studies involve only small numbers of people and, thus, all of them can be included. Often, however, research focuses on such a large population that, for practical reasons, it is only possible to include some of its members in the investigation. We then have to draw a **SAMPLE** from the total population.

In such cases, we will be confronted with the following questions:

- What is the group of people (STUDY POPULATION) from which we want to draw a sample?
- How many people do we need in our sample?
- How will these people be selected?

The study population has to be clearly defined, for example, according to age, sex, and residence. Apart from persons, a study population may consist of villages, institutions, records, etc.

Each study population consists of STUDY UNITS. The way we define our study population and our study unit depends on the problem we want to investigate. For example:

Problem	**Study population**	**Study unit**
Malnutrition related to weaning in district X	All children 6-24 months of age in District X	One child between 6 and 24 months in District X
High drop-out rates in primary schools in District Y	All primary schools in District Y	One primary school in District Y
Inappropriate record-keeping for hypertensive patients registered in hospital Z	All records on hypertensive patients in hospital Z	One record on a hypertensive patient registered in hospital Z

Representativeness

If researchers want to draw conclusions that are valid for the whole study population, they should take care to draw a sample in such a way that it is **representative** of that population.

A REPRESENTATIVE SAMPLE has all the important characteristics of the population from which it is drawn.

For example:

If you intend to interview 100 mothers to obtain a complete picture of the weaning practices in District X you would have to select these mothers from a representative sample of villages. It would be unwise to select them from only one or two villages as this might give you a distorted or biased picture. It would also be unwise to interview only mothers who attend the under-5s clinic, as those who do not attend this clinic may wean their children differently.

Sometimes, however, representativeness of the sample is *not* a major concern. For example, in exploratory studies, where the main aim is to get a rough impression of how certain variables are distributed in the population or to identify and explore new variables, you may deliberately choose to include study units that are the extremes in the study population, with respect to certain characteristics (see Module 9).

II. SAMPLING METHODS

An important issue influencing the choice of the most appropriate sampling method is whether a **sampling frame** is available, that is, a listing of all the units that compose the study population.

If a sampling frame is not available, it is not possible to sample the study units in such a way that the probability for the different units to be selected in the sample is known. Two such **nonprobability sampling methods** will be reviewed:

- Convenience sampling and
- Quota sampling.

If a sampling frame does exist or can be compiled, **probability sampling methods** can be used. With these methods, each study unit has an equal or at least a known probability of being selected in the sample. The following probability sampling methods will be discussed:

- Simple random sampling,
- Systematic sampling,
- Stratified sampling, and
- Cluster sampling.
- Multistage Sampling.

Nonprobability sampling methods

1. Convenience sampling

CONVENIENCE SAMPLING is a method in which for convenience sake the study units that happen to be available at the time of data collection are selected in the sample.

Many clinic-based studies use convenience samples.

> **For example**, a researcher wants to study the attitudes of villagers toward family-planning services provided by the MCH clinic. He decides to interview all adult patients who visit the out-patient clinic during one particular day. This is more convenient than taking a random sample of people in the village, and it gives a useful first impression.

A drawback of convenience sampling is that the sample may be quite unrepresentative of the population you want to study. Some units may be over-selected, others under-selected or missed altogether. It is impossible to adjust for such a distortion. If you need to be representative you have to use another sampling method.

2. Quota sampling

QUOTA SAMPLING is a method that ensures that a certain number of sample units from different categories with specific characteristics appear in the sample so that all these characteristics are represented.

In this method the investigator interviews as many people in each category of study unit as he can find until he has filled his quota.

> **For example**, the researcher of the family-planning study just mentioned suspects that religion might have a strong effect on patients' attitudes toward the family-planning services. He is afraid to miss the Catholics, who are a minority in the area. He, therefore, decides to include in the study 60 patients from each of the different religious groups (Hindus, Muslims, Protestants, and Catholics) and to extend the study over 3 or 4 days to obtain the desired sample.

Quota sampling is useful when researchers feel that a convenience sample would not provide the desired balance of study units. However, like a convenience sample, it does not claim to be representative of the entire population.

Probability sampling methods

Nonprobability sampling methods are inappropriate if the aim is to measure variables and generalize findings obtained from a sample to the total study population. Nonprobability sampling, for example, would not be appropriate in a study that aims to determine the prevalence of malnutrition in a whole province. For this type of study a probability sampling method should be used.

PROBABILITY SAMPLING involves random selection procedures to ensure that each unit of the sample is chosen on the basis of chance. All units of the study population should have an equal or at least a known chance of being included in the sample.

Probability sampling requires that a listing of all study units exists or can be compiled. This listing is called the **sampling frame**.

1. Simple random sampling

This is the simplest form of probability sampling. To select a simple random sample you need to:

- Make a numbered list of all the units in the population from which you want to draw a sample;
- Decide on the size of the sample (this will be discussed later);
- Select the required number of sampling units, using a "lottery" method or a table of random numbers (Annex 11.1 explains how to use a table of random numbers).

For example, a simple random sample of 50 students is to be selected from a school of 250 students. Using a list of all 250 students, each student is given a number (1 to 250), and these numbers are written on small pieces of paper. All the 250 papers are put in a box, after which the box is shaken vigorously to ensure randomization. Then, 50 papers are taken out of the box and the numbers are recorded. The students belonging to these numbers will constitute the sample.

2. Systematic sampling

In SYSTEMATIC SAMPLING individuals are chosen at regular intervals (for example every fifth) from the sampling frame. Ideally we randomly select a number to tell us where to start selecting individuals from the list.

For example, a systematic sample is to be selected from 1200 students of a school. The sample size selected is 100. The sampling fraction is:

$$\frac{100\ (\text{sample size})}{1200\ (\text{study population})} \qquad \frac{1}{12}$$

The sampling interval is, therefore, 12.

The number of the first student to be included in the sample is chosen randomly, for example by blindly picking one out of twelve pieces of paper, numbered 1 to 12. If number 6 is picked, then every twelfth student will be included in the sample, starting with student number 6, until 100 students are selected: the numbers selected would be 6, 18, 30, 42, etc.

Systematic sampling is usually less time consuming and easier to perform than simple random sampling. However, there is a risk of bias, as the sampling interval may coincide with a systematic variation in the sampling frame. For instance, if we want to select a random sample of days on which to count clinic attendance, systematic sampling with a sampling interval of 7 days would be inappropriate, as all study days would fall on the same day of the week, which might, for example, be a market day.

3. Stratified sampling

The simple random sampling method described above does not ensure that the proportions of individuals with certain characteristics in the sample will be the same as those in the whole study population.

If it is important that the sample includes representative groups of study units with specific characteristics (for example, residents from urban and rural areas, or different age groups), then the sampling frame must be divided into groups, or STRATA, according to these characteristics. Random or systematic samples of a predetermined size will then have to be obtained from each group (stratum). This is called STRATIFIED SAMPLING.

Stratified sampling is only possible when we know what proportion of the study population belongs to each group we are interested in.

An advantage of stratified sampling is that we can take a relatively large sample from a small group in our study population. This allows us to get a sample that is big enough to enable us to draw valid conclusions about a relatively small group without having to collect an unnecessarily large (and hence expensive) sample of the other, larger groups. However, in doing so, we are using unequal sampling fractions, and it is important to correct for this when generalizing our findings to the whole study population.

> **For example**, a survey is conducted on household water supply in a district comprising 20,000 households, of which 20% are urban and 80% rural. It is suspected that in urban areas the access to safe water sources is much more satisfactory. A decision is made to include 100 urban households (out of 4000, which gives a 1 in 40 sample) and 200 rural households (out of 16,000, which gives a 1 in 80 sample). Because we know the sampling fraction for both strata, the access to safe water for all the district households can be calculated.

4. Cluster sampling

It may be difficult or impossible to take a simple random sample of the units of the study population, either because a complete sampling frame does not exist, or because of other logistical difficulties (e.g., visiting people who are scattered over a large area may be too time consuming). However, when a list of groupings of study units is available (e.g., villages or schools) or can be easily compiled, a number of these groupings can be randomly selected.

The selection of groups of study units (clusters) instead of the selection of study units individually is called CLUSTER SAMPLING.

Clusters are often geographic units (e.g. districts, villages) or organizational units (e.g. clinics, training groups).

> **For example**, in a study of the knowledge, attitudes, and practices related to family planning in rural communities of a region, a list is made of all the villages. Using this list, a random sample of villages is chosen and all the adults in the selected villages are interviewed.

5. Multistage sampling

In very large and diverse populations sampling may be done in two or more stages. This is often the case in community-based studies, in which people to be interviewed are from different villages, and the villages have to be chosen from different areas.

> **For example**, in a study of utilization of pit latrines in a district, 150 homesteads are to be visited for interviews with family members as well as for observations on types and cleanliness of latrines. The district is composed of six wards and each ward has between six and nine villages.
>
> The following four-stage sampling procedure could be performed:
>
> 1. Select three wards out of the six by simple random sampling.
> 2. For each ward, select five villages by simple random sampling (15 villages in total).
> 3. For each village select ten households. Because simply choosing households in the centre of the village would produce a biased sample, the following systematic sampling procedure is proposed:
>   - Go to the centre of the village.
>   - Choose a direction in a random way: spin a bottle on the ground and choose the direction the bottleneck indicates.
>   - Walk in the chosen direction and select every third or every fifth household (depending on the size of the village) until you have the ten you need. If you reach the boundary of the village and you still do not have ten households, return to the centre of the village, walk in the opposite direction and continue to select your sample in the same way until you have ten. If there is nobody in a chosen household, take the next nearest one.
> 4. Decide beforehand whom to interview (for example the head of the household, if present, or the oldest adult who lives there and who is available).

A MULTISTAGE SAMPLING procedure is carried out in phases and usually involves more than one sampling method.

The main **advantages** of cluster and multistage sampling are that:

- A sampling frame of individual units is not required for the whole population. Initially a sampling frame of clusters is sufficient. Only within the clusters that are finally selected do we need to list and sample the individual units.
- The sample is easier to select than a simple random sample of similar size, because the individual units in the sample are physically together in groups, instead of scattered all over the study population.

Their main **disadvantage** is that:

> Compared to simple random sampling, there is a larger probability that the final sample will not be representative of the total study population. The likelihood of the sample not being representative depends mainly on the number of clusters selected in the first stage. The larger the number of clusters, the greater the likelihood that the sample will be representative.

III. BIAS IN SAMPLING

BIAS in sampling is a systematic error in sampling procedures that leads to a distortion in the results of the study.

Module 10 discussed how the use of faulty data-collection tools could lead to biased results. Bias can also be introduced as a consequence of **improper sampling procedures** that result in the sample not being representative of the study population.

> **For example**, a study was conducted to determine the health needs of a rural population to plan primary health care activities. However, a nomadic tribe, which represented one third of the total population, was left out of the study. As a result, the study did not give a picture of the health needs of the total population.

There are several possible sources of bias in sampiing. The best known source of bias is **nonresponse.**

Nonresponse is encountered mainly in studies where people are being interviewed or asked to fill in a questionnaire. They may refuse to be interviewed or forget to fill in the questionnaire. The problem lies in the fact that nonrespondents in a sample may exhibit characteristics that differ systematically from the characteristics of respondents.

There are several ways to deal with this problem and reduce the possibility of bias:

- Data collection tools (including written introductions for the interviewers to use with potential respondents) have to be pretested. If necessary, adjustments should be made to ensure better cooperation.
- If nonresponse is due to absence of the subjects, follow-up of nonrespondents may be considered.
- If nonresponse is due to refusal to cooperate, an extra, separate study of nonrespondents may be considered to discover to what extent they differ from respondents.
- Another strategy is to include additional people in the sample, so that nonrespondents who were absent during data collection can be replaced. However, this can only be justified if their absence was very unlikely to be related to the topic being studied.

Note:

The bigger the nonresponse rate, the more necessary it becomes to take remedial action. It is important in any study to mention the nonresponse rate and to honestly discuss whether and how it might have influenced the results.

Other sources of bias in sampling may be less obvious, but at least as serious:

- **Studying volunteers only.** The fact that volunteers are motivated to participate in the study may mean that they are also different from the study population on the factors being studied. It is better to avoid using nonrandom procedures that introduce the element of choice.
- **Sampling of registered patients only.** Patients reporting to a clinic are likely to differ systematically from people seeking treatment at home.
- **Missing cases of short duration.** In studies of the prevalence of disease, cases of short duration are more likely to be missed. This may often mean missing fatal cases, cases with short episodes, and mild cases.
- **Seasonal bias.** It may be that the problem under study exhibits different characteristics in different seasons of the year. For this reason, data on the prevalence and distribution of malnutrition in a community, for example, should be collected during all seasons rather than just at one time. When investigating health services' performance, to take another example, one has to take into account the fact that toward the end of the financial year shortages may occur in certain budget items which may affect the quality of services delivered.
- **Tarmac bias.** Study areas are often selected because they are easily accessible. However, these areas are likely to be systematically different from more inaccessible areas.

IV. ETHICAL CONSIDERATIONS

If the recommendations from a study will be implemented in the entire study population, one has the ethical obligation to draw a sample from this population in a representative way. If part way through the research, new evidence suggests that the sample was not representative, this should be mentioned in any publication concerning the study, and care must be taken not to draw conclusions or make recommendations that are not justified.

GROUP WORK, PART I (2 hours)

1. Develop in your working group:

   - a definition of your study population(s);
   - a definition of your different study units (people, clinics, records, etc);
   - appropriate sampling procedures for your study (taking into account whether or not you will have a sampling frame). Try to avoid possible bias.

2. Prepare a summary on a flip chart for use in the exercise and in the plenary discussion (after group work on sample size).

V. SAMPLE SIZE

Having decided **how** to select our sample, we now have to determine our **sample size**.

It is a widespread belief among researchers that the bigger the sample, the better the study becomes. This is **not necessarily true**. In general it is much better to increase the **accuracy** of data collection (for example by improving the training of interviewers or by better pretesting of the data-collection tools) than to increase sample size after a certain point. Also, it is better to make extra efforts to get a **representative** sample rather than to get a very large sample.

As a general rule we can say that the **desirable sample size** is determined by the expected variation in the data: the more varied the data are, the larger the sample size we will need to attain the same level of accuracy.

For cross-sectional surveys and analytical studies precise calculations can usually be made that indicate the desirable sample size. Examples of such calculations follow below.

For exploratory studies, we cannot say more than that the sample size needs to be large enough to reflect important variations in the population, but small enough to allow for intensive study methods.

> **Example:**
>
> In a study on attitudes toward family planning, you may decide to interview three categories of informants (nonusers, female users, and male users), and start with 20 to 30 interviews per category. This number could be increased if the data obtained for each category do not indicate a certain trend or if results are conflicting.

The eventual sample size is usually a compromise between what is DESIRABLE and what is FEASIBLE.

The **feasible sample size** is determined by the availability of resources:

- time,
- manpower,
- transport, and
- money.

Remember that if persons are to be interviewed at their homes, it is often more time consuming to go and trace the people than to actually do the interview. In addition, remember that resources are not only needed to collect the information, but also to analyze it!

- If you include many variables in your study (which is usually the case in an exploratory type of study) the sample size should be relatively small, to avoid problems during analysis. If you have few variables, you can afford to have a larger sample.

The following general rules may help to determine the **desirable sample size** of any given study:

- The desirable sample size depends on the expected variation in the data (of the most important variables): the more varied the data are, the larger the sample size we would need to attain the same level of accuracy. For exploratory studies it is important that the sample size is large enough to reflect important variations in the population, but small enough to allow for intensive study methods.

- The desirable sample size also depends on the number of cells we will have in the cross-tabulations (see **Module 13**) required to analvze the results. A rough guideline is to have at least 20 to 30 study units per cell.

  For example, in a study on attitudes toward family planning, where you are interested in differences between males and females, you may decide to interview users and nonusers of family-planning services. It is recommended that you have at least 20 to 30 people in each of the four categories, i.e., male users, female users, male nonusers and female nonusers. These numbers could be increased later, if the data obtained for each category do not indicate a certain trend or if they provide conflicting information.

For some studies it may be possible to do **sample size calculations** before embarking on the project to find the desirable sample size. The formulae for calculating a desired sample size are listed in **Annex 11.2** They are divided into two categories, depending on whether the study:

- seeks to measure **one single variable** (e.g., a mean, a rate, or a proportion) with a certain precision, or
- tries to demonstrate a **significant difference** between two groups.

The formulae can only be used if you have a rough idea about the outcome of the study, which is not always the case. You may want to call upon a statistician or an experienced researcher who can help you choose and use the appropriate formulae.

Without going into detail on sample size calculations, we will look at a few **examples** that highlight some important issues.

Example:

In a descriptive study in a certain village, we want to measure with a certain precision the proportion of children, aged 12-23 months, who are vaccinated against measles, using a simple random sample. The following steps should be taken:

1. Estimate how big the proportion might be (say 80%);

2. Choose the margin of error you will allow in the estimate of the proportion (say ±10%). This means that, if in the survey indeed 80% of the children are found to be vaccinated, this proportion will probably be between 70 and 90% in the whole study population from which the sample was drawn.

3. Choose the **precision** with which you want to be confident that the vaccination coverage in the whole population is indeed between 70 and 90%. You can never be 100% sure. Do you want to be 95% sure? Or 99%?

The required sample size in this example, using a desired precision of 95%, would be 64 children. (See formula 1.3 in Annex 11.2.)

Note that if you want a smaller margin of error you need a larger sample. If you want more precision your sample also must be larger.

If in the above example you want to be 95% sure that the vaccination coverage in the population is between 75% and 85% (instead of 70-90%), you would need a sample of 256 children. If you want to be 99% sure (instead of 95%) that the proportion in the population is between 70 and 90%, you need a sample of 144 children.

Note also that in general you need more precision (or a smaller margin of error) if the estimated proportion is very small. This is the case, for example, for the proportion of women with goitre or the maternal mortality rate in a population.

Table 11.1. Required sample size for studies of women with goitre.

	Estimated proportion of women with goitre	**Margin of error (95% precision)**	**Required sample size**
District A	1/100 = 1%	±0.5%	1600
District B	1/1000 = 0.1%	±0.05%	16,000

The table shows that in district B, where goitre is less prevalent, a smaller margin of error is desired and, therefore, the required sample is larger. (**Annex 11.3** explains how these sample sizes were calculated.)

In comparative studies, one usually wants to demonstrate that there is a significant difference between two groups. In this type of study the sample size depends primarily on the estimated size of the difference between the two groups that are compared. The larger the difference, the smaller the sample needed to show this difference.

Second, the sample size depends on how large we want the probability to be that we will indeed find a significant difference. The larger the sample size, the larger the probability of finding a significant difference.

> **Example:**
>
> In a study, a comparison will be made between the feeding patterns of well nourished and malnourished children of 12 to 17 months. It is expected that 90% of the well nourished children are breastfed whereas about 50% of the malnourished children are breastfed. The sample size in each group of children needs to be only 15 to show a significant difference.
>
> However, if 90% of the well nourished children and 80% of the malnourished children were breast fed, the sample size would need to be 175 in each group to show a significant difference. (**Annex 11.3** explains how these sample sizes can be calculated.)

Note that it may be useful to conduct sample-size calculations for each of the objectives of the study. These calculations may reveal, for instance, that some but not all objectives can be met. Or they may indicate that some variables need only to be measured on a subsample.

GROUP WORK, PART II (1 hour)

1. Determine the sample size requirements for the study population(s) defined in the previous group work session. Consider the issues discussed in the module when establishing the desirable sample size(s). Use **Annex 11.2** if sample-size calculations have to be made.

2. Determine the feasible sample size after taking into account available time, manpower, transport, and money.

   If there is a large discrepancy between the desirable and the feasible sample size, you should look for a compromise and, if necessary, adjust the objectives of your study.

3. Put a summary of your group's work on a flip chart for use in the exercise below and in the plenary discussion that will follow.

4. It will be easier for you to develop a realistic plan for data collection (Module 12) as well as the budget for your project (**Module 17**) if you already know as precisely as possible **where** and **from whom** data are going to be collected. Therefore, it is important that you select the sample for your study **immediately** after the plenary session on sampling. If you choose a multistage sampling strategy you may find at this stage that it is possible only partially to draw the sample.

EXERCISE (1/2 hour)

1. Examine the definitions of study population and study units, the sampling procedures, and the proposed sample size developed by another group.
2. Identify possible sources of bias in sampling and suggest improvements.
3. Put your comments on flip chart for presentation in plenary.

Annex 11.1. How to use random number tables[1]

1. First, decide how large a number you need. Next, count if it is a one, two, or larger digit number. For example, if your sampling frame consists of 10 units, you must choose from numbers 1-10, (inclusive). You must use **two** digits to ensure that 10 has an equal chance of being included.

   You also use two digits for a sampling frame consisting of 0-99 units.

   If, however, your sampling frame has 0-999 units, then you obviously need to choose from **three** digits. In this case, you take an extra digit from the table to make up the required three digits. For example, the number in columns 10, 11, row 27: 43, would become 431; going down, the next numbers would be 107, 365 etc.

   You would do the same if you needed a **four** digit number, for a sampling frame 0-9999 units. In our example of the number on columns 10, 11, 12, row 27 of the table: 431, this would now become 4316, the next down 1075, and so on.

2. Decide beforehand whether you are going to go across the page to the right, down the page, across the page to the left L, or up the page.

3. Without looking at the table, and using a pencil, pen, stick, or even your finger, pin-point a number.

4. If this number is within the range you need, take it. If not, continue to the next number in the direction you chose before-hand, (across, up or down the page), until you find a number that is within the range you need.

   For example if you need a number between 0-50 and you began at column 21, 22, row 21 you get 74 which is obviously too big. So you could go down (having decided beforehand to go down) to 97, also too big, to 42, which is acceptable, and select it.

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[1] The random number table on the following page has been taken from Hill, A.B. 1977. A short textbook of medical statistics. Hodder and Stoughton, London, UK.

Random sampling numbers

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	8	0	9	4	2	5	2	5	8	2	4	7	1	3	4	7	7	4	3	3	3	6	2	0	1	8	9	7	2	1	3	4
2	3	5	6	3	2	1	9	8	8	2	1	1	9	0	4	5	2	6	1	8	2	7	5	1	2	6	2	7	1	0	9	5
3	1	3	3	0	6	3	3	1	3	7	5	3	9	6	9	3	8	7	3	8	6	8	1	5	1	5	3	8	8	5	4	3
4	3	5	6	5	0	0	1	6	2	2	4	3	6	4	3	2	4	7	9	6	6	0	9	5	5	2	8	3	1	6	2	0
5	7	8	5	0	5	9	2	5	5	5	8	8	7	3	1	1	2	1	9	2	4	5	4	5	3	5	3	0	5	5	8	9
6	4	4	9	0	5	4	1	7	9	7	2	7	6	1	5	3	5	9	0	1	4	8	7	8	9	9	8	0	9	8	7	7
7	6	5	4	5	9	1	0	4	9	3	1	8	8	8	1	9	7	5	3	7	2	7	8	5	9	3	7	3	2	4	4	5
8	3	6	2	6	5	9	9	5	1	2	1	5	9	7	5	3	9	2	2	3	5	6	5	8	2	9	4	4	2	8	9	9
9	4	6	6	5	4	8	2	0	7	5	5	4	0	6	1	2	9	6	8	3	4	2	5	1	9	1	3	8	1	7	0	9
10	6	4	9	8	7	5	1	9	0	4	7	4	7	8	1	8	6	8	3	2	9	6	8	3	9	8	7	2	4	0	9	0
11	6	7	2	2	9	8	6	9	9	3	6	1	7	8	7	5	4	8	8	3	1	3	1	5	9	6	7	9	8	8	3	4
12	9	7	4	8	5	9	3	2	5	1	1	5	2	7	2	1	0	0	3	3	9	3	0	3	9	7	1	3	4	0	1	2
13	5	6	4	1	1	4	1	7	1	4	1	9	7	4	3	4	8	1	6	5	7	3	6	8	1	2	1	8	5	0	3	9
14	7	4	4	4	9	2	0	0	8	8	4	0	5	8	8	2	4	3	9	8	3	9	0	4	9	1	9	9	9	3	3	6
15	8	2	7	9	3	0	1	9	4	6	7	2	3	7	4	3	3	9	7	9	4	6	8	9	9	0	2	1	6	9	9	0
16	0	1	6	1	7	6	1	7	1	0	2	4	2	3	8	7	2	8	9	1	6	6	7	7	1	5	8	5	2	4	8	2
17	7	3	8	8	9	7	5	9	7	5	5	5	6	6	2	4	9	9	7	7	2	0	0	8	5	5	9	6	9	7	4	0
18	7	8	3	0	4	7	1	4	3	6	9	5	2	9	1	9	1	8	0	4	4	0	4	4	1	0	3	4	2	5	9	7
19	9	8	8	7	4	2	1	6	6	5	2	6	4	5	3	5	8	4	3	0	5	2	7	0	9	6	0	5	0	7	6	8
20	1	2	6	1	2	5	1	6	8	5	6	9	2	3	1	0	3	9	3	9	8	7	0	3	9	8	4	1	0	3	5	3
21	3	9	4	7	4	9	3	7	7	6	3	4	2	5	4	3	6	2	3	9	7	4	5	5	2	0	5	5	7	7	9	5
22	4	5	5	0	8	1	0	3	1	2	5	0	2	3	0	4	1	1	3	6	9	7	8	8	9	1	4	4	4	5	2	6
23	1	3	4	4	9	6	9	7	2	3	8	3	6	9	7	6	6	2	5	1	4	2	0	1	2	0	3	8	6	5	5	2
24	8	9	7	6	5	8	2	3	8	4	8	7	0	4	5	0	3	1	0	6	9	1	6	6	2	7	1	7	7	6	0	1
25	7	7	1	0	9	9	4	3	6	9	7	8	8	2	7	3	9	7	1	4	9	7	0	0	1	5	6	6	2	8	8	9
26	6	9	5	9	6	0	0	8	8	4	4	2	2	2	8	2	1	5	2	4	2	5	1	7	5	8	1	8	0	0	8	1
27	7	9	4	1	2	3	1	2	2	4	3	1	6	7	0	2	9	9	8	4	3	4	6	9	3	0	8	5	4	7	6	2
28	2	2	8	4	0	8	9	6	9	1	0	7	5	5	4	2	7	3	1	9	3	7	8	2	1	0	6	8	9	5	7	4
29	9	5	9	4	7	4	1	6	9	3	6	5	6	0	4	5	1	1	8	3	5	9	1	6	9	5	9	9	1	1	4	3
30	4	6	1	3	8	5	4	9	6	3	6	9	3	2	0	8	5	1	0	9	9	6	8	0	1	1	6	8	6	1	3	3

Annex 11.2. Formulae for calculating sample size[2]

The formulae for calculating required sample size are divided in two categories:

1. For studies trying to measure a variable with a certain precision.
2. For studies seeking to demonstrate a significant difference between two groups.

1. Measuring one variable

In the formulae below, the following abbreviations are used:

n, sample size
s, standard deviation
e, required size of standard error (in the text of the module the term "margin of error" is used for ±2 times the size of the standard error if a precision of 95% is required. If a precision of 99% is required, the margin of error is ±3 times the size of the standard error.)
r, rate
p, percentage

1.1 Single mean

In a study the mean weight of newborn babies will be determined. The mean weight is expected to be 3000 grams. Weights are approximately normally distributed and 95% of the birth weights are probably between 2000 and 4000 grams; therefore the standard deviation would be 500 grams. The desired 95% confidence interval is 2950 to 3050 grams, so the standard error would be 25 grams. The required sample size would be:

$$n = \frac{s^2}{e^2} = \frac{500^2}{25^2} = \frac{250{,}000}{625} = 400 \text{ new born babies}$$

1.2 Single rate

The maternal mortality rate in a country is expected to be 70 per 10,000 live births. A survey is planned to determine the maternal mortality rate with a 95% confidence interval of 60 to 80 per 10,000 live births. The standard error would therefore be 5/10,000. The required sample size would be:

$$n = \frac{r}{e^2} = \frac{70/10000}{(5/10000)^2} = 28{,}000 \text{ live births}$$

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[2] Modified from Kirkwood, B. 1988. Essentials of medical statistics. Blackwell Scientific Publications, Oxford, UK.

1.3 Single proportion

The proportion of nurses leaving the health services within 3 years of graduation is estimated to be 30%. A study, which aims to find causes for this, also aims to determine the percentage leaving the service with a confidence interval of 25% to 35%. The standard error would, therefore, be 2.5%. The required sample size would be:

$$n = \frac{p\,(100 - p)}{e^2} = \frac{30 \times 70}{2.5^2} = 336 \text{ nurses}$$

1.4 Difference between two means (sample size in each group)

The difference of the mean birth weights in district A and B will be determined. In district A the mean is expected to be 3000 grams with a standard deviation of 500 grams (as above). In district B the mean is expected to be 3200 grams with a standard deviation of 500 grams. The difference in mean birth weight between districts A and B is, therefore, expected to be 200 grams. The desired 95% confidence interval of this difference is 100 to 300 grams, giving a standard error of the difference of 50 grams. The required sample size would be:

$$n = \frac{s_1^2 + s_2^2}{e^2} = \frac{500^2 + 500^2}{50^2} = 200 \text{ newborns in each district}$$

1.5 Difference between two rates (sample size in each group)

The difference in maternal mortality rates between urban and rural areas will be determined. In the rural areas the maternal mortality rate is expected to be 100 per 10,000 and in the urban areas 50 per 10,000 live births. The difference is, therefore, 50 per 10,000 live births. The desired 95% confidence interval is 30 to 70 per 10,000 live births giving a standard error of the difference of 10/10,000. The required sample size would be:

$$n = \frac{r_1 + r_2}{e^2} = \frac{100/10{,}000 + 50/10{,}000}{(10/10{,}000)^2} = 15{,}000 \text{ live births in each area}$$

1.6 Difference between two proportions (sample size in each group)

The difference in the proportion of nurses leaving the service is determined between two regions. In one region 30% of the nurses are estimated to leave the service within 3 years of graduation, in the other region 15%, giving a difference of 15%. The desired 95% confidence interval for this difference is 5% to 25%, giving a standard error of 5%. The sample size in each group would be:

$$n = \frac{p_1\,(100 - p_1) + p_2\,(100 - p_2)}{e_2}$$

$$= \frac{30 \times 70 + 15 \times 85}{5_2} = 135 \text{ nurses in each region}$$

2. Significant difference between two groups

In the formulae below the following abbreviations are used:

- n, samples size
- s, standard deviation
- e, required size of standard error
- r, rate
- p, percentage
- u, one-sided percentage point of the normal distribution, corresponding to 100% - the power. The power is the probability of finding a significant result. (e.g. if the power is 75%, u = 0.67).
- v, percentage point of the normal distribution, corresponding to the (two-sided) significance level. (e.g. if the significant level is 5% (as usual), v = 1.96.).

2.1 Comparison of two means (sample size in each group)

The birth weights in district A and B will be compared. In district A the mean birth weight is expected to be 3000 grams with a standard deviation of 500 grams. In district B the mean is expected to be 3200 grams with a standard deviation of 500 grams (see 1.4). The required sample size to demonstrate (with a likelihood of 90%) a significant difference between the mean birth weights in district A and B would be:

$$n = \frac{(u + v)^2 (s_1^2 + s_2^2)}{(m_1 - m_2)^2}$$

$$= \frac{(1.28 + 1.96)^2 (500^2 + 500^2)}{(3200 - 3000)^2} = 131 \text{ newborn babies in each district}$$

2.2 Comparison of two rates (sample size in each group)

The maternal mortality rates in urban and rural areas will be compared. In the rural areas the maternal mortality rate is expected to be 100 per 10,000 and in the urban areas 50 per 10,000 live births (compare to 1.5, above). The required sample size to show (with a likelihood of 90%) a significant difference between the maternal mortality in the urban and rural areas would be:

$$n = \frac{(u + v)^2 (r_1 + r_2)}{(r_1 - r_2)^2}$$

$$= \frac{(1.28 + 1.96)^2 (100/10{,}000 + 50/10{,}000)}{(100/10{,}000 - 50/10{,}000)^2} = 6299 \text{ live births in each area}$$

2.3 Comparison of two proportions (sample size in each group)

The proportion of nurses leaving the health service is compared between two regions. In one region 30% of nurses is estimated to leave the service within three years of graduation, in the other region it is probably 15%.

The required sample size to show, with a 90% likelihood, that the percentage of nurses is different in these two regions would be:

$$n = \frac{(u + v)^2 \{p_1 (100 - p_1) + p_2 (100 - p_2)\}}{(p_1 - p_2)^2}$$

$$= \frac{(1.28 + 1.96)^2 (30 \times 70 + 15 \times 85)}{(30 - 15)^2} = \text{157 nurses in each group}$$

Annex 11.3. Explanation of sample-size calculation given in the text

1. Prevalence of goitre (p. 14)

Formula used: $n = \frac{p(1-p)}{e^2}$ (formula 1.3 in Annex 11.2)

District A: **proportion** is 1% = 0.01, as the 95% confidence interval is the proportion ± 2 × **standard error**, the standard error is 0.25% = 0.0025.

$$n = \frac{0.01 \times 0.99}{(0.0025)^2} = 1600$$

District B: proportion is 0.1% = 0.001
standard error is 0.025% = 0.00025

$$n = \frac{0.001 \times 0.999}{(0.00025)^2} = 16{,}000$$

2. Feeding patterns in malnourished and well nourished children (p. 15)

Formula used: $n = \frac{(u+v)^2 \{p_1 (100 - p_1) + p_2 (100 - p_2)\}}{(p_1 - p_2)^2}$ (formula 2.3 in Annex 11.2)

$$n_1 = \frac{(0.67 + 1.96)^2 \{(10 \times 90) + (50 \times 50)\}}{(90 - 50)^2} = 15$$

$$n_2 = \frac{(0.67 + 1.96)^2 \{(10 \times 90) + (20 \times 80)\}}{(90 - 80)^2} = 173$$

If the power is 75%, u = 0.67 and $(u + v)^2 = 6.9$;
if the power is 90%, u = 1.28 and $(u + v)^2 = 10.5$.
(The power is the probability of finding a significant result.)

If the power is increased from 75% to 90% the sample size is increased 10.5/6.9 (i.e. 1.5 times.)

Module 11: SAMPLING

Timing and teaching methods

The topic on sampling has two components which preferably would be presented in two separate sessions. These sessions will require 6 1/2 hours in total.

Materials

- Calculators,
- Paper.

Introduction to sampling procedures (parts I-IV of Module 11)

Timing and teaching methods

1 hour	Introduction and discussion
2 hours	Group work

Introduction and discussion

- When presenting part I of this module, make sure that everyone understands what sampling is and why it is done.

- In the presentation of sampling methods (part II), use examples as much as possible. You may even do an exercise to show the differences between the different sampling methods.

  For example, you may sample 6 or 8 persons from your audience using simple random sampling and systematic sampling (from an alphabetical list of participants and facilitators). Ask the participants to name the sampling method applied and discuss the advantages and disadvantages of each method. (As names tend to cluster according to origin, it is likely that the systematic sampling will turn out to be less representative than the simple random sampling.)

- Allow time during and after the presentation for questions and discussion.

Group work (part I)

- Have the working groups choose appropriate sampling methods for their own projects. The methods should be worked out in as much detail as possible.

Introduction to sample size (part V of Module 11)

Timing and teaching methods

1/2 hour	Introduction and discussion
1 hour	Group work
1/2 hour	Exercise
1-1/2 hours	Group reports in plenary

Introduction and discussion

Stress that one does not always have to do calculations to determine the desired sample size. Actually, in many (exploratory) HSR studies you would not do any calculations, although for the sampling procedures a plan must be worked out and adhered to (e.g. selection of extremes, convenience or quota sampling, or even a probability sampling method).

The formulae for calculating a desired sample size are, therefore, put in an annex. You are not expected to go into technical details of sample size calculations during your presentation.

Group work (part II)

- Let each group determine the sample size for the proposal they are working on.

- Participants should be advised to consult experts when they think they will need to calculate sample size, but do not know how to go about it. Make sure, for this reason, that there is a statistician present who can be consulted during group work and plenary presentations.

- If a group plans to measure statistical entities such as infant or maternal mortality rates in their study, they should definitely consult a professional with statistical training.

Exercise

At the end of this group work session each group should examine another group's chosen sampling procedures and sample size. Ask the groups to look for possible sources of bias and make suggestions for reducing it.

Plenary

- Have each group present their sampling methods and sample size, immediately followed by the comments of the group that examined the sampling methods for bias. A discussion can follow each presentation or be held after all the group presentations.

- Emphasize that, after incorporating useful suggestions from the plenary discussion, the groups should actually select their samples, as far as possible (e.g., sampling of districts, villages, clinics). This will be useful for the next group work sessions (especially Modules 12 and 17).

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 12:

PLAN FOR DATA COLLECTION

Steps in the development of an HSR proposal

Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data-collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 12: PLAN FOR DATA COLLECTION

OBJECTIVES

At the end of this session, you should be able to:

1. **Identify** and discuss the most important points to be considered when preparing a plan for data collection.
2. **Determine** what resources are available and needed to carry out your study.
3. **Describe** typical problems that may arise during data collection and how they may be solved.
4. **Prepare** a plan for data collection for the research proposal you are developing.

I. Introduction

II. Stages in the data-collection process

I. INTRODUCTION

Where are we now in the development of our research proposal?

Look again at the diagram in Module 7 that introduces the research methodology. We have just finished four crucial theoretical sessions, in which we have defined:

- what information we want to collect to answer the research questions implied in our objectives (**Module 8: Variables**)
- what **approach** we will follow to collect this information (**Module 9: Study type**)
- what **techniques** and **tools** we will use to collect it (**Module I0: Data-collection techniques**)
- **where** we want to collect the data, **how** we will select our sample, and **how many** subjects we will include in our study (**Module 11: Sampling**)

Now we enter a new phase in the development of our research methodology: planning our fieldwork. We have to plan concretely **how** we will **collect** the data we need (**Modules 12 and 15**), how we will **analyze** it (**Module 13**), and how we can **test** the most crucial parts of our methodology (**Module 14**). Finally, we will have to develop a **plan** for project administration and monitoring (**Module 16**) and to budget the **resources** necessary to carry out the study (**Module 17**).

A PLAN FOR DATA COLLECTION can be made in two steps:

1. Listing the tasks that have to be carried out and who should be involved, making a rough estimate of the time needed for the different parts of the study, and identifying the most appropriate period in which to carry out the research.
2. Actually scheduling the different activities that have to be carried out each week in a workplan.

Before the workshop is finished, a pretest of the data collection and data analysis procedures should be made. The advantages of conducting the pretest **before** we finalize our proposal is that we can draft the workplan and budget based on realistic estimates, as well as revise the data collection tools before we submit the proposal for approval.

However, if this is not possible (for example, because the proposal is drafted far from the field, and there are no similar research settings available close to the workshop site), the field test may be done after finishing the proposal, but long enough before the actual fieldwork to allow for a thorough revision of data collection tools and procedures.

Why should you develop a plan for data collection?

A plan for data collection should be developed so that:

- you will have a clear overview of what tasks have to be carried out, who should perform them, and the duration of these tasks;

- you can organize both human and material resources for data collection in the most efficient way; and
- you can minimize errors and delays that may result from lack of planning (for example, the population not being available or data forms being misplaced).

It is likely that while developing a plan for data collection you will identify problems (such as limited manpower) that will require modifications to the proposal. Such modifications might include adjustment of the sample size or extension of the period for data collection.

II. STAGES IN THE DATA-COLLECTION PROCESS

What are the main stages in the data-collection process?

Three main stages can be distinguished in the data-collection process:

Stage 1: PERMISSION TO PROCEED
Stage 2: DATA COLLECTION
Stage 3: DATA HANDLING

Stage I: Permission to proceed

Consent must be obtained from the relevant authorities, individuals, and the community in which the project is to be carried out. This may involve organizing meetings at national or provincial level, at district, and at village level. For clinical studies this may also involve obtaining written informed consent.

Most likely the principal investigator will be responsible for obtaining permission to proceed at the various levels. The health research unit in the ministry of health or the institution organizing the course may assist in obtaining permission from the national level.

Note:

In many countries research proposals have to be screened for scientific and ethical integrity by national research councils. However, proposals developed during workshops may be exempted from this procedure if the research is considered as a training exercise and the research council assumes that the course facilitators have screened the methodology during the workshop.

Stage II: Data collection

When collecting our data, we have to consider:

- Logistics: who will collect what, when, and with what resources; and
- Quality control.

1. Logistics of data collection

WHO will collect WHAT data?

When allocating tasks for data collection, it is recommended that you first list them. Then you may identify who could best implement each of the tasks. If it is clear beforehand that your research team will not be able to carry out the entire study by itself, you might look for research assistants to assist in relatively simple but time-consuming tasks.

For example, in a study into the effects of improvements in delivery care on utilization of these services the following task division could be proposed:

Task	**To be carried out by**
Record study	Research team
Focus group discussions with health staff before and after individual staff interviews	Research team
Individual health staff interviews	Research team
Shadowing MCH nurses	Principal investigator
Interviews with mothers (community based) before and after delivery	Research assistants, under supervision of research team

HOW LONG will it take to collect the data for each component of the study?

Step 1: Consider:

- The time required to reach the study area(s).
- The time required to locate the study units (persons, groups, records). If you have to search for specific informants (e.g., users or defaulters of a specific service), it might take more time to locate informants than to interview them.
- The number of visits required per study unit. For some studies it may be necessary to visit informants a number of times, for example, if the information needed is sensitive and can be collected only after informants are comfortable with the investigator or if observations have to be made more than once (follow-up of pregnant mothers or malnourished children). Allowing time for follow-up of nonrespondents should also be considered.

Step 2: Calculate the number of interviews that can be carried out per day (e.g., 4).

Step 3: Calculate the number of days needed to carry out the interviews. For example:

- you need to do 200 interviews,
- your research team of 5 people can do $5 \times 4 = 20$ interviews per day,
- you will need $200 \div 20 = 10$ days for the interviews.

Step 4: Calculate the time needed for the other parts of the study. (for example, 10 days)

Step 5: Determine how much time you can devote to the study. Because the research team usually consists of very busy people, it is unlikely that team members can spend more than 30 working days on the entire study.

- 5 days for preparation (including pretesting and finalizing questionnaires)
- 20 days actual fieldwork
- 5 days data processing + preliminary analysis.

If the team has 20 days for fieldwork, as in the example above, it could do the study without extra assistance. However, it the research team has only five days available for the interviews, they would need an additional five research assistants to help complete this part of the study.

Note:

Recruiting research assistants for data collection may, on one hand, relieve the research team, but, on the other hand, the training and supervision of research assistants require time (see Annex 12.1). The team has to carefully weigh advantages and disadvantages. If none of the team members has previous research experience, they might prefer designing a study that they can carry out themselves, without or with only minimal assistance.

If research assistants are required, consider to what extent local health workers can be used. They have the advantage of knowing the local situation. They should never be involved, however, in conducting interviews to evaluate the performance of their own health facility. Local staff from related services (teachers, community development) or students might help out. Sometimes village health workers or community members can collect certain parts of the data.

Note:

It is always advisable to slightly overestimate the period needed for data collection to allow for unforeseen delays.

In WHAT SEQUENCE should data be collected?

In general, it is advisable to start with analysis of data already available. This is essential if the sample of respondents is to be selected from the records. Another rule of thumb is that qualitative research techniques (such as focus group discussions) that are devised to focus the content of questionnaires should be carried out before finalization of the questionnaires. If the FGDs are to provide feedback on issues raised in larger surveys, however, they should be conducted after preliminary analysis of the questionnaires.

To use time and transport efficiently, data to be drawn from different sources in one locality should be collected at the same time. (For example, interviews with staff in a health centre, observations of equipment available in the centre, and interviews with mothers living nearby should be scheduled together.)

WHEN should the data be collected?

The actual time that the data will be collected will be determined by the type of data to be collected and the demands of the project. Consideration should be given to:

- availability of research team members and research assistants,
- the appropriate season(s) to conduct the fieldwork (if the problem is season-related or if data collection would be difficult during certain periods),
- accessibility and availability of the sampled population, and
- public holidays and vacation periods.

Note:

The field visit to obtain consent from local authorities for the research may also be used to obtain necessary details about the best period for data collection and availability of local resources (research assistants, transport), if required.

2. Ensuring quality

It is extremely important that the data we collect are of good quality, that is, reliable and valid. Otherwise we may come up with false or misleading conclusions.

In the previous modules **possible sources of data distortion** (bias) have been discussed. Biases we should try to prevent include:

- **Deviations from the sampling procedures** set out in the proposal.
- **Variability or bias in observations or measurements** made because:
    - Our **study subject changes his or her behaviour** as a consequence of the research. For example, a subject may act more positively while being observed; blood pressure and pulse may increase when the subject is apprehensive.
    - We use **unstandardized measuring instruments.** For example, we may use unstandardized weighing scales or imprecise or no guidelines for interviewing.
    - Researchers themselves vary in what they observe or measure (**observer variability**). For example, researchers may be selective in their observations (observer bias); measure, question, or note down answers with varying accuracy or follow different approaches (one being more open, friendly, probing than the other).

- **Variations in criteria for measurement or for categorizing answers** because we changed them during the study.

There are a number of measures that can be taken to prevent and partly correct such distortions, but remember: prevention is FAR better than cure! Cure is usually surgery: you may have to cut out the bad parts of your data or, at best, devise crutches.

There are several other aspects of the data-collection process that will help ensure data quality. You should:

- **Prepare a fieldwork manual for the research team as a whole,** including:
  - guidelines on **sampling procedures** and what to do if respondents are not available or refuse to cooperate (see Module 11, p. 7),
  - a clear **explanation** of the purpose and procedures of the study, which should be used to introduce each interview, and
  - **instruction sheets** on how to ask certain questions and how to record the answers.

- **Select your research assistants, if required, with care.** Choose assistants that are:
  - from the same educational level;
  - knowledgeable concerning the topic and local conditions;
  - not the object of study themselves; and
  - not biased concerning the topic (for example, health staff are usually not the best interviewers for a study on alternative health practices).

- **Train research assistants carefully in all topics covered in the fieldwork manual as well as in interview techniques** (see **Annex 12.1**) and make sure that all members of the research team master interview techniques such as:
  - asking questions in a neutral manner;
  - not showing by words or expression what answers one expects;
  - not showing agreement, disagreement, or surprise; and
  - recording answers precisely as they are provided, without sifting or interpreting them.

- **Pretest research instruments and research procedures** with the whole research team, including research assistants (see **Module 14**).

- **Take care that research assistants are not placed under too much stress** (requiring too many interviews a day; paying per interview instead of per day).

- **Arrange for on-going supervision** of research assistants. If, in case of a larger survey, special supervisors have to be appointed, supervisory guidelines should be developed for their use.

- **Devise methods to assure the quality** of data collected by all members of the research team. For example, quality can be assured by:
  - requiring interviewers to check whether the questionnaire is filled in completely before finishing each interview;

- asking the supervisor to check at the end of each day during the data collection period whether the questionnaires are filled in completely and whether the recorded information makes sense;
- having the researchers review the data during the data analysis stage to check whether data are complete and consistent.

Stage III: Data handling

Once the data have been collected, a clear procedure should be developed for handling and storing them:

- First, it is necessary to check that the data gathered are complete and accurate (see section on quality control above).
- At some stage questionnaires will have to be numbered. Decide if this should be done at the time of the interview or at the time the questionnaires are stored.
- Identify the person responsible for storing data and the place where they will be stored.
- Decide how data should be stored. Record forms should be kept in the sequence in which they have been numbered.

GROUP WORK (1 3/4 hours)

Make a plan for data collection, considering the points below:

1. **Permission to proceed** (10 minutes)

   - Which organizations or individuals should be approached to obtain permission to proceed with the research project?
   - Who will ask for permission? When? What procedures will be followed?

2. **Data collection** (1-1/4 hours)

   - List the different components of your study and the number of interviews, observations, or measurements required.
   - Calculate for each component how many interviews or observations can be done per day by one person.
   - Decide if you need extra assistance, considering the fact that you, as a research team, will probably not be able to spend more than approximately 20 working days per person in the field and 5 days per person for preparation of the fieldwork.
   - If you need research assistants: For which components of the research? How many research assistants? Who would be the right persons to assist you and for how many days will you need them?
   - How will you train them? (place, timing, content, duration, trainers).
   - How will you ensure their supervision?
   - How will the quality of the data be checked and by whom?

3. **Data handling** (5 minutes)

   - How will the questionnaires/checklists be numbered?
   - How will the data be stored and who has the final responsibility for storing the data?

4. **Ethical considerations** (15 minutes)

   Take care that your data-collection process is ethical in all respects:

   - How have you planned to obtain informed consent from your informants? Are there any categories of informants that need special consideration (e.g. children, sick persons, mentally disabled individuals)?
   - Are certain parts of the research focused on sensitive issues? How will you handle problems that may arise?
   - Do certain parts of your research require extra attention to assure confidentiality? How will you handle this issue?

5. **Summarize the outcome** of your group work on a flip chart. Record the details of your discussions so that you can use them in developing your work plan (**Module 15**).

Annex 12.1. Training interviewers

1. Interviewers' tasks

During the fieldwork, interviewers (or research assistants) may work independently or together with one of the researchers. If they go out independently, they may have to carry out the following tasks:

- Do the **sampling in the field** (for example sampling of households within a village and/or sampling of individuals to be interviewed within households).

- Give a clear **introduction** to the interviewee concerning the purpose and procedures of the interview.

- **Perform the interviews.** Obviously it is best to give interviewers standard questionnaires to administer. It is not wise to assign the more difficult tasks of performing highly flexible interviews or focus group discussions to interviewers.

It is imperative that interviewers be trained by the researchers so they can carry out their tasks accurately and correctly, according to the procedures developed by the researchers. Interviewers should not be left to develop their own procedures. If each interviewer is allowed to develop his own approach, bias is almost certain to result.

The training of interviewers may take 2 to 3 days. The first day may be devoted to theory, followed by 1 or 2 days of practical training, depending on the local circumstances and the nature of the study.

2. Theoretical training

Interviewers must be thoroughly familiar with the objectives of the research project and the methodology. Therefore, it is recommended that they be provided with a copy of the research protocol and that the most relevant sections be discussed thoroughly, including:

- statement of the problem,
- objectives,
- data-collection tools to be used (an overview),
- sampling procedures (if sampling has to be done in the field),
- plan for data collection, and
- plan for data analysis.

It is important at this stage that the interviewer trainees get ample opportunity to ask questions.

Then a more in-depth discussion should follow concerning the data-collection tools (questionnaires and possibly checklists) that are to be used by the interviewers. For each and every question they should know WHY the information is required.

Interviewers should be taught basic interview techniques, such as

- asking questions in a neutral manner;
- not showing by words or expression what answers one expects;
- not showing agreement, disagreement, or surprise; and
- recording answers to open questions precisely as they are provided, without sifting or interpreting them.

Clear instructions should be given, as well, concerning to what extent the interviewer is allowed to alter the phrasing of questions, if it seems necessary, and whether he or she should probe for answers. For questions that have pre-categorized answers it should be made clear whether the possible answers should be mentioned by the interviewer during the interview or not. (Usually they are not to be mentioned.) There should be no misunderstandings concerning how to record answers and observations.

Finally, explanations should be given concerning how the interviewer should introduce him or herself to the interviewee, what to say concerning the purpose of the study, how to ask for consent, and how to close the interview.

3. Practical training

Practical training in interviewing is essential. This may be provided in two stages.

First, **role plays** can be performed, during which one trainee assumes the role of the interviewer and another plays the interviewee. Other trainees and the trainers (researchers) should observe carefully what happens and give constructive feedback right after the role play. Then roles can be changed, until each trainee has had the chance to practice each type of interview at least once.

Second, a **field test** should be conducted, which will serve two purposes: the training of the interviewers and a (further) test of the data-collection tools. A test of the tools is essential if a previous field test resulted in important changes or if the questionnaire(s) were translated into a local language after the first field test. If the interviewer trainees are involved in the proper phrasing of questions it will definitely strengthen their interest and commitment.

The field test is best carried out in groups of 2 to 3 persons (see **Module 14**), with each team including at least one trainer and one trainee. Note that after the field test constructive critique of each interview should be made, starting from the moment the interviewee was approached up to the farewell.

4. Supervision of interviewers

Even if interviewers are used, responsibility for the research remains with the researchers. To guarantee the quality of the data collected it is important to supervise the interviewers' performance, especially at the beginning of the data-collection period. If they are going out into the field independently, plans could be made to accompany them on selected visits or to question a small sample of the interviewees concerning key aspects of the interview.

As a further quality control check, it is important that the interviewer's name (or interviewer's code) appears on each questionnaire/checklist so that it is possible to ask for clarification if certain information is not clear.

Module 12: PLAN FOR DATA COLLECTION

Timing and teaching methods

3/4 hour	Introduction and discussion
1 3/4 hours	Group work
1 hour	Plenary
3 1/2 hours	TOTAL TIME

Introduction and discussion

- Explain that we are entering a new phase in the development of the methodology, in which we go from theory to practice — the concrete planning of the data-collection process.

- Of the three phases that can be distinguished in the planning for data collection (i.e., permission to proceed, actual data collection, and data handling), planning for actual data collection will require most attention, both in the presentation and in the group work.

- The **logistics** of data collection is one major aspect of the planning: WHO will collect WHAT and WHEN. It is important that relatively inexperienced researchers give thought to this aspect of data collection **before** the pretest, so that they can consciously check whether their plans are realistic.

  As the participants begin planning for data collection they should clearly distinguish and list the **different components** of their study. Next, they should consider the **time** it will take to carry out the different components, so that they can decide whether they can do the study alone or whether they need assistance.

- Take the most labour intensive part of one of the studies being developed in the workshop and follow the steps outlined in the module to determine the time needed.

  If you do not want to favour one of the groups, you can use the example of the utilization of delivery care provided in the module, or any other example that resembles the topics participants are working on.

- Discuss the advantages and disadvantages of using research assistants and of using local health-service personnel as research assistants.

- Then proceed to the second major aspect of the planning for data collection, that of ensuring quality.

- Stress the importance of preparing a fieldwork manual (irrespective of whether research assistants are recruited) and of using appropriate interview techniques. Refer to Annex 12.1 for more detailed guidelines on how to train interviewers.

Group work

- Make sure that participants have understood the principle of calculating the time required for each component of the study and that they calculate carefully the time needed for the most labour intensive parts of the study, so that they can decide:

    - whether they need assistance, and
    - who would be appropriate research assistants, if required.

- Let them summarize ethical issues involved in data collection that have been discussed during previous presentations. Participants need to include a section on ethical considerations in their research proposal (see **Module 18** or **Module 1** for content of the research proposal).

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 13:

PLAN FOR DATA PROCESSING AND ANALYSIS

Steps in the development of an HSR proposal

Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data-collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	

N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 13: PLAN FOR DATA PROCESSING AND ANALYSIS

OBJECTIVES

At the end of this session, you should be able to:

1. **Identify** important issues related to sorting, quality control, and processing of data.
2. **Describe** how data can best be analyzed and interpreted based on the objectives and variables of the study.
3. **Prepare** a plan for the processing and analysis of data (including data master sheets and dummy tables) for the research proposal you are developing.

I. Introduction

II. Sorting data

III. Performing quality-control checks

IV. Data processing

V. Data analysis

I. INTRODUCTION

EXERCISE:

At the start of this session, all participants will be asked to fill in a questionnaire (see Annex 13.1) to be used later in an exercise on data processing and analysis.

Why is it necessary to prepare a plan for processing and analysis of data?

Such a plan helps the researcher assure that at the end of the study:

- All the information he or she needs has indeed been collected, and in a standardized way;
- He or she has not collected unnecessary data that will never be analyzed.

This implies that the plan for data processing and analysis must be made after careful consideration of the objectives of the study as well as the list of variables.

The procedures for the analysis of data collected through qualitative and quantitative techniques are quite different. Therefore, one must also consider the type(s) of study and the different data-collection techniques used when making a plan for data processing and analysis.

For **quantitative data**, the starting point in analysis is usually a description of the data for each variable for all the study units included in the sample.

For **qualitative data**, it is more a matter of describing, summarizing, and interpreting data obtained for each study unit (or for each group of study units). Here the researcher **starts analyzing while collecting the data** so that questions that remain unanswered (or new questions that come up) can be addressed before data collection is over. (See **Module 10C**).

Preparation of a plan for data processing and analysis will provide you with better insight into the feasibility of the analysis to be performed as well as the resources that are required. It also provides an important review of the appropriateness of your data-collection tools.

Note:

The plan for processing and analysis of data must be prepared **before** the data is collected in the field **so that it is still possible to make changes in the list of variables or the data-collection tools.**

What should the plan include?

When making a plan for data processing and analysis the following issues should be considered:

- Sorting data,
- Performing quality-control checks,
- Data processing, and
- Data analysis.

II. SORTING DATA

An appropriate system for sorting data is important for facilitating subsequent processing and analysis.

If you have different study populations (for example village health workers, village health committees, and the general population), you obviously would number the questionnaires **separately**.

In a comparative study, it is best to sort the data right after collection into the two or three groups that you will be comparing during data analysis.

> **For example**, in a study concerning the reasons for low acceptance of family-planning services, users and nonusers would be basic categories; in a study of the reasons why nurses object to being posted in rural areas, rural and urban nurses would be basic categories; in a case-control study obviously the cases are to be compared with the controls.

It is useful to number the questionnaires belonging to each of these categories **separately** right after they are sorted.

> **For example**, the questionnaires administered to users of family-planning services could be numbered U1, U2, U3, etc., and those for the nonusers N1, N2, N3, etc.

In a cross-sectional survey it may be useful to sort the data into two or more groups, depending on the objectives of the study.

EXERCISE, Part 1: Processing and analyzing questionnaires

The questionnaire that was completed at the beginning of this session will now be used to determine the relationship between cigarette smoking and episodes of coughing during the past 2 days. Discuss what would be the most appropriate way of processing and analyzing the questionnaires.

III. PERFORMING QUALITY-CONTROL CHECKS

Usually the data have already been checked in the field to ensure that all the information has been properly collected and recorded. Before and during data processing, however, the information should be checked again for **completeness and internal consistency**.

- If a questionnaire has not been filled in completely you will have MISSING DATA for some of your variables. If there are many missing items in a particular questionnaire, you may decide to exclude the whole questionnaire from further analysis.

- If an inconsistency is clearly due to a mistake made by the researcher or assistant (for example, if a person in an earlier question is recorded as being a nonsmoker, whereas all other questions reveal that he is smoking), it may still be possible to check with the person who conducted the interview and to correct the answer.

- If the inconsistency is less clearly a mistake in recording, it may be possible (in a small-scale study) to return to the respondent and ask for clarification.

- If it is not possible to correct information that is clearly inconsistent, you may consider excluding this particular part of the data from further processing and analysis. If a certain question produces ambiguous or vague answers throughout, the whole question should be excluded from further analysis.

Note:

A decision to exclude data should be considered carefully, as it may affect the validity of the study. Such a decision is ethically correct and it testifies to the scientific integrity of the researcher. You should keep an accurate count of how many answers or questionnaires you had to exclude because of incompleteness or inconsistency, and discuss it in your final report.

If you process your data by computer, quality-control checks must also include a verification of how the data has been transformed into codes and subsequently entered into the computer.

IV. DATA PROCESSING

As you begin planning for data processing, you must make a decision concerning whether to process and analyze the data:

- manually, using data master sheets or manual compilation of the questionnaires, or
- by computer, for example, using a microcomputer and existing software or self-written programs for data analysis.

Data processing involves:

- categorizing the data,
- coding, and
- summarizing the data on master sheets.

Categorizing

Decisions have to be made concerning how to categorize responses.

For **categorical variables** that are investigated through closed questions or observation (**for example**, observation of the presence or absence of latrines in homesteads) the categories have been decided upon beforehand.

In interviews, the answers to open-ended questions (**for example,** Why do you smoke?) can be pre-categorized to a certain extent, depending on the knowledge of possible answers. However, there should always be a category called "others, specify ...", which can only be categorized afterwards. These responses should be listed and placed in categories that are a logical continuation of the categories you already have. Answers that are difficult or impossible to categorize may be put into a separate residual category called "others," but this category should not contain more than 5% of the answers obtained.

For **numerical variables**, the data are usually collected without any pre-categorization. Because you are often still discovering the range and the dispersion of the different values of these variables when you collect your sample (e.g., home-clinic distance for out-patients), decisions concerning how to categorize numerical data (and how to code them) are usually made **after** they have been collected.

Coding

If data are entered into a computer for subsequent processing and analysis, it is essential to develop a CODING SYSTEM.

CODING is a method used to convert (translate) the data gathered during the study into symbols appropriate for analysis.

For computer analysis, eacn category of a variable is usually given a number, for example, the answer "yes" may be coded as 1, "no" as 2 and "no response" as 9.

The codes should be entered on the questionnaires (or checklists) themselves. When finalizing your questionnaire, for each question, you should insert a box for the code in the right margin of the page. These boxes should not be used by the interviewer. They are only filled in afterwards during data processing. Take care that you have as many boxes as the number of digits in each code.

Note:

If you intend to process your data by computer, always consult an experienced person before you finalize your questionnaire.

Also, if analysis is done by hand using data master sheets, it is useful to code your data.

Coding conventions

Common responses should have same code in each questions, as this minimizes mistakes by coders.

For example

Yes (or positive response)	code - 1
No (or negative response)	code - 2
Don't know	code - 9

Codes for open-ended questions

This can be done only after examining a sample of questionnaires. The most frequently occurring responses should be coded. It may be necessary to group similar types of responses into single categories, so as to limit their number. If there are too many categories it is difficult to make meaningful summaries during analysis.

Finally it should be borne in mind that the personnel responsible for computer analysis should be consulted very early in the study, i.e., as soon as the questionnaire and dummy tables are finalized.

Data master sheet

If data are processed by hand, it is often most efficient to summarize the raw research data in a so-called **DATA MASTER SHEET** to facilitate analysis. On a master sheet, all the answers of individual respondents are tallied by hand.

Table 13.1. Example of a master sheet.

Respondent number	Q1: Age (years)	Q2: Sex		Q4: Smoking			Q5: No. of cigarettes
		M	F	Yes	No	No response	
1	30	✓		✓			10
2	41		✓		✓		—
3	23		✓	✓			15–20
etc.							
Total							

Data are easier to tally from the master sheets than from the original questionnaires. Straight counts can be performed for background variables (such as sex, residence), and for all independent variables under study (such as smoker/nonsmoker in the exercise).

Questionnaire data may be compiled by hand instead of using master sheets if it is difficult or impossible to put the information (such as answers to open-ended questions) in a master sheet. Hand compilation is also necessary if you want to go back to the raw data to make additional tabulations in which different variables are related to each other.

Note:

In a comparative (analytical) study, you should use different master sheets for the two or three groups you are comparing (e.g., users and nonusers of FP services).

In a cross-sectional survey, it may be useful to have several master sheets depending on the nature and objectives of the study and whether you want to compare two or more groups. In the example given in the Exercise, it is useful to have one data master sheet for people with episodes of cough and another for those without cough.

Great care should be taken when filling in master sheets. You should verify that all totals correspond to the total number of study units (respondents). If not, all subsequent analytical work will be based on erroneous figures. There should be special columns for "no response" or missing data, to arrive at accurate total figures.

Hand compilation is used when the sample size is small.

Certain procedures will help ensure accuracy and speed.

1. If only one person is doing the compilation, use **manual sorting**. If a team of two persons work together, use either manual sorting or **tally counting**.

2. **Manual sorting** can be used only if data on each subject are on a different sheet(s) of paper.

3. To do **manual sorting**, the basic procedure is to:

   - Take one question at a time,
   - Sort the questionnaires into different piles representing the various responses to the question (examples: male/female; used hospital/health centre/traditional practitioners),
   - Count the number in each pile.

   When you need to sort out subjects who have a certain combination of variables (e.g., females who used each type of health facility) sort the questionnaires into piles according to the first question, then subdivide the piles according to the response to the other question.

4. To do **tally counting** the basic procedure is:

   - One member of the compiling team reads out the information while the other records it in the form of a tally (e.g. "III" representing three subjects or "~~IIII~~" representing five subjects who have a particular variable).

   - Tally count for no more than two variables at one time (e.g., sex plus type of facility used).

   If it is necessary to obtain information on three variables (e.g., sex, time of attendance at health centre, and diagnosis), do a manual sorting for the first question, then tally count for the other two variables.

After tally counting, add the tallies and record the number of subjects in each group.

5. After doing either manual or tally counting **check** the total number of subjects/responses in each question to make sure that there has been no omission or double count.

Note:

Researchers often assume that hand compilation is merely "common sense" and do not train their staff in the correct procedure. Subsequently many hours of work are wasted in trying to detect the source of errors due to double counts, wrong categorization, and omissions.

EXERCISE, Part 2: Data master sheet

The questionnaires (or the two piles of questionnaires) will be divided among four or five groups of participants in such a way that everybody is involved in the exercise. Each group will be asked to summarize the data on a master sheet (see Annex 13.2) and to calculate totals. One group will put its data on a master sheet on a flip chart, so everyone can see and discuss it.

Computer compilation

Before you decide to use a computer, you have to be sure that it will save you time or that the quality of the analysis will benefit from it. Note that feeding the data into a computer costs time and money. The computer should not be used if your sample is small and the number of variables large. The larger the sample, the more beneficial the use of a computer will be. Also be sure that the necessary equipment is available as well as the necessary expertise.

Computer compilation consists of the following steps:

1. Choosing an appropriate computer program,
2. Data entry,
3. Verification or validation,
4. Programing (if necessary),
5. Computer outputs.

1. Choosing an appropriate computer program

A number of computer programs are available on the market that can be used to process and analyze research data. The most widely used programs are:

- LOTUS 1-2-3, a spreadsheet program (from the Lotus Development Corporation)

- dBase (version III plus or IV), a data-management program (from Ashton-Tate)

- Epi Info (version 5), a very consumer friendly program for data entry and analysis, which also has a word processing function for creating questionnaires (developed by the Centers for Disease Control, Atlanta, and the World Health Organization, Geneva).

- SPSS, which is a quite advanced Statistical Package for Social Sciences (by SPSS Inc.).

If you intend to use a computer, you may ask advice from an experienced person concerning which program is the most appropriate for your type of data. Note that Epi Info may be freely used and copied. All the other programs have copyrights.

2. Data entry

To enter data into the computer you have to develop a data entry format, depending on the program you are using. However, it is possible to enter data using dBase (which is relatively good for data entry) and do the analysis in LOTUS 1-2-3 or SPSS.

After decideding on a data entry format, the information on the data-collection instrument will have to be coded (e.g., Male: 1, Female: 2). During data entry, the information relating to each subject in the study is keyed into the computer in the form of the relevant code (e.g., if the first subject (identified as 0001) is a male (code 1) aged 25, the data could be keyed in as 001125).

Note that data entry can be done through the private sector, which may be fast and inexpensive. Health office staff who are not accustomed to this work tend to be slow and make many errors in entry.

3. Verification

During data entry, mistakes will definitely creep in. The computer can print out the data exactly as it has been entered, so the printout should be checked visually for obvious errors, (e.g., exceptionally long or short lines, blanks that should not be there, alphabetic codes where numbers are expected, obviously wrong codes).

Examples:
- codes 3-8 in the column for sex
- codes above 250 when you had only 250 subjects.

If possible, computer verification should be built in. This involves giving the appropriate commands to identify errors.

Example:
The computer can be instructed to identify and print out all subjects where the "sex" column has a code 3-8.

4. Programing

If you use computer personnel to analyze your data, it is important to **communicate effectively** with them. Do not leave the analysis to the computer specialist! You as a researcher should tell the computer personnel:

- the names of all the variables in the questionnaire;
- the location of these variables in relation to the data for one subject (i.e., the data format);
- how many subjects are to be analyzed and which groups are to be compared;
- whether any variables are to be recoded or calculated; and
- for which variables you need straight tabulations and which variables you would like to cross-tabulate.

A certain amount of basic training is needed to use any of the above-mentioned computer programs and to give the appropriate commands.

5. Computer outputs

The computer can do all kinds of analysis and the results can be printed. It is important to decide whether each of the tables, graphs, and statistical tests that can be produced makes sense and should be used in your report.

V. DATA ANALYSIS

Frequency counts

From the data master sheets, simple tables can be made with **frequency counts** for each variable. A frequency count is an enumeration of how often a certain measurement or a certain answer to a specific question occurs.

For example,

Smokers	63
Nonsmokers	74
Total	137

If numbers are large enough it is better to calculate the frequency distribution in percentages **(relative frequency)**. This makes it easier to compare groups than when only absolute numbers are given. In other words, percentages standardize the data.

A PERCENTAGE is the number of units in the sample with a certain characteristic, divided by the total number of units in the sample and multiplied by 100.

In the above **example** the calculation of the percentage answers the question: If I had asked 100 people who had an episode of coughing if they smoke cigarettes, how many would have answered "yes"? The percentage of people answering "yes" would be: $\frac{63}{137} \times 100 = 46\%$.

A **frequency table** such as the following could then be presented:

Table 13.2. Numbers of smokers and nonsmokers in the sample.

Category	Frequency*	Relative frequency
Smokers Nonsmokers	63 74	46% 54%
Total	137	100%

*Missing data: 3.

Note:

Sometimes data are missing due to nonresponse or (in oral interviews) nonrecording by the interviewer. Usually you do not use missing data in the calculation of percentages. However, the number of missing data is a useful indication of the quality of your data collection and, therefore, this number should be mentioned, for example as a note to your table (see table 13.2, for example).

"Don't know" is **not** to be taken as a nonresponse. If applicable, a category "don't know" should appear in the data master sheet and in the frequency table.

It is usually necessary to summarize the data from numerical variables by dividing them into categories. This process includes the following steps:

1. Inspect all the figures: What is their range? (The range is the difference between the largest and the smallest measurement.)

2. Divide the range in three to five categories. You can either aim at having a reasonable number in each category (e.g., 0-2 km, 3-4 km, 5-9 km, 10+ km for home-clinic distance) or you can define the categories in such a way that they all start with round numbers (e.g. 20-29 years, 30-39 years, 40-49 years, etc.).

3. Construct a table indicating how data are grouped and count the number of observations in each group.

When inspecting frequency distributions and ranges, you may still discover that certain data are incorrect. In this case, appropriate action must be taken, as described in section III (quality-control checks).

EXERCISE, Part 3: Frequency tables

All groups of participants are asked to make a frequency distribution for the variables sex and age, using the information from the data master sheets in Part 2 of this Exercise. (See Annex 13.3 for examples of dummy tables.) The totals will be put in a table on the flip chart.

Cross-tabulations

In addition to making frequency counts for one variable at a time, it may be useful to combine information on two or more variables to describe the problem or to arrive at possible explanations for it.

For this purpose it is necessary to design CROSS-TABULATIONS.

Depending on the objectives and the type of study, three different kinds of cross-tabulations may be required:

1. Descriptive cross-tabulations, which aim at describing the problem under study;
2. Analytic cross-tabulations, in which groups are compared to determine differences; and
3. Analytic cross-tabulations, which focus on exploring relationships between variables.

When the plan for data analysis is being developed, the data are, of course, not yet available. However, to visualize how the data can be organized and summarized, it is useful at this stage to construct so-called DUMMY cross-tabulations.

A DUMMY TABLE contains all elements of a real table, except that the cells are still empty.

For example, in the exercise it would be useful to compare the answer to question 3 on coughing with the major independent variable smoking/nonsmoking.

Table 13.3. Episodes of coughing in smokers and nonsmokers.

	Cough in last 2 days	No cough in last 2 days	Total
Smokers			
Nonsmokers			
Total			

In a research proposal dummy tables should be prepared to show the major relationships between variables.

Note:

It is extremely important to determine before you start collecting the data what tables you will need to assist you in looking for possible explanations of the problem you have identified. This will prevent you from collecting too little or too much data in the field. It will also save you much time in the data-processing stage. Care should be taken not to embark on an unstructured comparison of all possible variables. **The dummy tables to be prepared follow from the specific objectives of the study.**

If we process the data by hand, we will have to **tally** how often each **combination** of outcomes of two variables occurs.

> **For example**: If you asked how many smokers did cough in the last 2 days, how many nonsmokers did so, how many smokers did not cough and how many nonsmokers did not cough, you might obtain the following result:

Table 13.4. Episodes of cough in smokers and nonsmokers.

	Cough in last 2 days	No cough in last 2 days	Total
Smokers	𝍸 𝍸 I 11	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 II 52	63
Nonsmokers	III 3	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 I 71	74
Total	14	123	137

Note:

One can tally in two ways, 𝍸 or ⧄. The latter type of tallying has been used by village health workers who are hardly literate.

There are two different ways to handle the data when doing the tallying. Either master sheets can be used or the original questionnaires can be sorted by hand.

In the latter case, you would go through the following steps for the above example:

- divide the forms into two piles, one for smokers and one for nonsmokers;
- divide each pile into one for those without cough and one for those who had an episode of cough (we now have four piles); and
- count the number in each pile and fill in the table.

Some practical hints when constructing tables:

- If a dependent and an independent variable are cross-tabulated, the independent variable is usually placed vertically (at the left side of the table in a column) and the dependent variable horizontally along the top of the table.
- All tables should have a clear title and clear headings for all rows and columns.

- All tables should have a separate row and a separate column for totals to enable you to check if your totals are the same for all variables and to make further analysis easier.

- All tables related to each objective should be numbered and kept together so the work can be easily organized and the writing of the final report will be simplified.

EXERCISE, Part 4: Cross-tabulation

Each of the groups of participants who have a set of questionnaires are asked to cross-tabulate smokers/nonsmokers and cough/no cough. All information will be put together in one cross-table (on flip chart, see Annex 13.4).

After completion of the table, answer the following questions:

- What percentage of smokers had cough within the past 2 days?
- Does this study confirm that smoking causes coughing?

To further analyze and interpret the data, certain calculations or **statistical procedures** must usually be completed. Especially in large cross-sectional surveys and in comparative studies, statistical procedures are necessary if the data is to be adequately summarized and interpreted. When conducting such studies it is, therefore, advisable to consult a person with statistical knowledge from the start in order that:

- correct sampling methods are used and an appropriate sample size is selected;

- decisions on coding are made that will facilitate data processing and analysis; and

- a clear understanding is reached concerning plans for data processing, analysis, and interpretation, including agreement concerning which variables need simple frequency counts and which ones need to be cross-tabulated.

Some elementary statistical procedures will be taught in the second workshop after fieldwork is completed. A knowledge of elementary statistics will help you better understand the whole process of data analysis and interpretation.

Analysis of qualitative data

Qualitative data may be collected through open-ended questions in self-administered questionnaires, individual interviews, focus group discussions, or through observations during fieldwork. For a detailed description of the analysis of qualitative data refer to Module 24 and Modules 10C and 10D which provide some of the basics. Here we will concentrate on the analysis of responses obtained from open-ended questions in interviews or self-administered questionnaires.

Commonly requested data in open-ended questions include:

- opinions of respondents on a certain issue;
- reasons for a certain behaviour; and
- description of certain procedures, practices, or beliefs/knowledge with which the researcher is not familiar.

Note that these data may also be obtained from questions asking for comments, following a closed question.

The data can be analyzed in three steps:

Step 1: List the data for each question. Take care to include the source of each item you list (in the case of questionnaires, you can use the questionnaire number) so that you can place it in the original context if required.

How you will categorize qualitative data depends on the type of data requested.

In the case of data on opinions and reasons, there may be a limited number of possibilities. **Opinions** may range from (very) positive, neutral, to (very) negative. Data on **reasons** may require different categories depending on the topic and the purpose of your question. In Part 5 of the exercise you are asked to categorize the reasons why people smoke by grouping them in such a way that it is easy to find entry points for health education aimed at reducing smoking.

Step 2: To establish your categories, first read through the whole list of answers. Then start giving codes (A, B, C, for example) for the answers that you think belong together.

Step 3: Next try to find a label for each category. After some shuffling you usually end up with 4 to 6 categories. You should enter these categories on the questionnaire and on the master sheet.

Note again that you may include a category "others," but that it should be as small as possible, preferably containing less than 5% of the total answers.

If you categorize your responses to open-ended questions in this way you can:

- report the percentage of respondents giving reasons or opinions that fall in each category; and
- analyze the content of each answer given in particular categories, to plan what actions should be taken (e.g., for health education).

Questions that ask for descriptions of procedures, practices, beliefs/knowledge (item 3) are usually not meant to be quantified (although you may quantify certain aspects of them). The answers rather form part of a jigsaw puzzle that you have to put together carefully. When you are analyzing questions of this type you may find it useful to list and categorize responses.

IN CONCLUSION, a plan for the processing and analysis of data includes:

- a decision on whether all or some parts of the data should be processed by hand or computer;
- preparation of dummy tables for the description of the problem, the comparison of groups (if applicable), or the establishment of relationships between variables, guided by the objectives of the study;
- a decision on the sequence in which tables should be analyzed, or in what order data should be analyzed;
- a decision on how qualitative data should be analyzed;
- an estimate of the total time needed for analysis and how long particular parts of the analysis will take;
- a decision concerning whether additional staff are required for the analysis; and
- an estimate of the total cost of the analysis.

GROUP WORK (2-1/2 hours)

EXERCISE, Part 5: Analysis of responses to open-ended questions

First, do Part 5 of the **Exercise** (see Annex 13.5) in your working groups (20 minutes).

Preparation of your plan for data processing and analysis

Next, prepare your plan for data processing and analysis, considering the following points:

1. **Sorting and quality control of data** (10 minutes):
   - How will the sorting be done? When?
   - What quality checks should be made? Who will do them? When?

2. **Processing of data** (50 minutes):
   - How will you do it (by hand or by computer)? If by computer: do you have enough experience and is the necessary equipment available?
   - Prepare data master sheets for your proposal (preferably on flip charts).
   - How many open-ended questions do you have that require categorizing or coding? Who will do the categorizing or coding? How much time will be required for data processing (taking into account the sample size)?

3. **Analyzing and interpreting the data** (1 hour):
   - Using the specific objectives and the list of variables, prepare dummy tables in which you relate variables to each other to analyze possible (causal) relationships. Select the dummy tables that you plan to fill in before we have our workshop on data analysis and reporting.
   - Make estimates of the time and materials required for the analysis (in our case, only for the period up to the second workshop during which we will continue the analysis of data).

4. **Prepare to present in plenary** your master sheet, three dummy tables, a list of other important variables that you would like to cross-tabulate, and rough estimates of manpower, time, and materials required for the analysis of data. (15 minutes)

Annex 13.1. Questionnaire for exercise

Questionnaire number_____

Please answer all questions below one by one after reading them carefully.

If boxes are provided, please put a tick ✓ in the applicable box.

1. Age: ________ (number of years)

2. Sex: male ☐

female ☐

3. Have you had an episode of coughing in the last 2 days?

Yes ☐

No ☐

4. Do you smoke cigarettes?

Yes ☐

No ☐

5. If "yes" to question 4: How many cigarettes do you smoke per day?
____ cigarettes

6. If "yes" to question 4: Why do you smoke?

____

____

____

____

Annex 13.2. Data master sheet for exercise, part 2

Questionnaire number	Q1	Q2			Q3			Q4			Q5
	Age, years	Sex			Cough			Smoking			Number of cigarettes
		M	F	NR	Yes	No	NR	Yes	No	NR	
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
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23											
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
Total											

Annex 13.3. Frequency tables for exercise, part 3

Categorical variable: Sex

Sex	Number	Percentage
Male		
Female		
Not stated		
TOTAL		100%

Numerical variable: Age

Age group	Number	Percentage
20-29		
30-39		
40-49		
50-59		
60+		
No response		
TOTAL		100%

Annex 13.4. Cross-tabulation for exercise, part 4

Table. Episodes of coughing during past 2 days among smokers and nonsmokers.

	Cough	No cough	TOTAL
Smokers			100%
Nonsmokers			100%
TOTAL			

After completing the tables, answer the following questions:

1. What percentage of smokers had an episode of coughing within the past 2 days?
2. Does this study confirm that smoking causes coughing?

Annex 13.5. Analysis of responses to open-ended questions for exercise, part 5

Please analyze and interpret the following answers, which were given to the question: **"Why do you smoke?"**

1. I have tried to give up so many times, but I have been unable to.
2. I like the feel of the cigarette in my hand.
3. Because it gives me pleasure.
4. I do not see why I should give up smoking.
5. Because I like to blow the smoke through my mouth and nose.
6. Because I feel confident and in charge when I am smoking.
7. It helps me to think better.
8. I like the image that comes with smoking.
9. I feel that people respect me more as a smoker.
10. All my friends are smokers.
11. It helps to make people more friendly and comfortable, especially when offering a cigarette.
12. Why not?!!
13. Smoking makes me feel like a man.
14. I like to blow smoke rings.
15. I like the taste.
16. It is too difficult to give up.
17. It helps me to relax.
18. It helps me to reduce the pressure and tension at work.
19. My wife likes a man who smokes.

Analyze and interpret these answers as follows:

- Develop a post-coding system by categorizing the answers. Try to categorize them in such a way that you can make different suggestions or recommendations for action for each category (for example, entry points for health education).
- After categorizing the responses, find an appropriate "label" for each category and count how many answers you have for each category.

Module 13: PLAN FOR DATA PROCESSING AND ANALYSIS

Timing and teaching methods

1 hour	Introduction (including exercise) and discussion
2-1/2 hours	Group work
1 hour	Plenary
4 1/2 hours	TOTAL TIME

Introduction and discussion

- Make sure that you have enough copies for all participants of the questionnaire (Annex 13.1) that is to be used in the exercise. At the start of the session ask the participants to fill in this questionnaire.

- Give a brief introduction to the topic, starting with an overview of your presentation.

- Explain and clarify terms, such as sorting, quality control, processing, categorizing, coding, and tallying.

- Emphasize the importance of an adequate numbering system for the different data collection tools: they can be either numbered before going into the field or afterwards or both.

- Discuss the pros and cons of using a computer if one or more groups intends to use it. If computers are not being used in the course, the section on Computer compilation can be omitted and participants can be asked to read it themselves if interested.

- Discuss the importance of having different data master sheets for different categories of informants.

- Pay special attention to how to deal with missing data: missing data should be recorded on the data master sheet so the groups can arrive at correct total figures. FOR EACH QUESTION/ITEM the total number of answers and the total number of missing values should add up to the total number of interviewees. If the totals are not correct, groups go astray when processing their data. This should be avoided if possible.

- In your conclusion, summarize the different components that should be included in a plan for data processing and analysis.

Exercise: Data processing and analysis

An exercise is presented in this Module to give participants a "feeling" for data processing, analysis, and interpretation. It will give them skills that will help them in the data processing and preliminary analysis of the results from their own research project before the second workshop.

Make sure that you know what is required of the participants at each step of the exercise:

Part 1: Processing and analyzing questionnaires

Divide the participants into 4 or 5 groups, while keeping them seated in plenary. Collect all questionnaires, number them and divide them equally over the groups, so that everyone is involved in the exercise. Discuss what would be the most appropriate way of classifying the pile of questionnaires.

Part 2: Data master sheet

Ask the groups to summarize the data in a data master sheet (see Annex 13.2) and to calculate totals. Ask one group to put its data in a master sheet on a flip chart so everyone can see it. This dummy data master sheet should be prepared in advance by the facilitator.

Part 3: Frequency tables

Let the groups prepare frequency distributions for the variables age and sex, using the information from the data master sheets (see Annex 13.3). Put the totals in a table on a flip chart.

Part 4: Cross-tabulation

Ask each of the groups of participants who have a set of questionnaires to cross-tabulate smokers/non-smokers and cough/no cough. Put all the information together in one cross-table on a flip chart (see Annex 13.4).

After completion of the table, ask the following questions:

> What percentage of smokers had an episode of coughing within the past 2 days?
>
> Does this study confirm that smoking causes coughing?

Part 5: Analysis of responses to open-ended questions

This can be done in the small working groups, before starting on the group work assignment. Assist the participants in analyzing and interpreting the 19 answers given in Annex 13.5 to the open-ended question. (Explain that to ensure a wide range of responses, they have been provided in the exercise, rather than using the real responses of the participants). One way you might categorize and interpret the answers is given on the next page.

Answer sheet to Part 5

1. Pleasure

I like the feel of the cigarette in my hand (no. 2)
Because it gives me pleasure (no. 3)
Because I like to blow the smoke through my mouth and nose (no. 5)
I like to blow smoke rings (no. 14)
I like the taste (no. 15)

2. Being sociable

All my friends are smokers (no. 10)
It helps to make people more friendly and comfortable, especially when offering a cigarette (no. 11)

3. Cannot give up/addiction

I have tried to give up so many times but I have been unable to (no. 1)
It is too difficult to give up (no. 16)

4. Status/confidence/respect

Because I feel confident and in charge when I am smoking (no. 6)
I like the image that comes with smoking (no. 8)
I feel that people respect me more as a smoker (no. 9)
Smoking makes me feel like a man (no. 13)
My wife likes a man who smokes (no. 19)

5. Reduction of tension

It helps me to think better (no. 7)
It helps me to relax (no. 17)
It helps me to reduce the pressure and tension at work (no. 18)

6. Defiance

I do not see why I should give up smoking (no. 4)
Why not?!! (no. 12)

The above statements may be interpreted as follows:

- Smoking seems to be very much a social activity as many of the responses were concerned with status and being sociable.
- In terms of possibilities for influencing the respondents to change their habits, category 1 and 2 might be the easiest: category 1 because there are many other things in life that give pleasure and are not harmful for one's health; category 2 because there are many other ways of being sociable that are less dangerous.

- Category 3 consists of people who are already motivated to stop smoking. With extra encouragement they might succeed.

- The ones who are in category 4 apparently need smoking to feel more secure. They might be more difficult to convince. One would perhaps have to find out why they are insecure and in what other ways they could deal with their insecurity (which might differ from person to person).

- Those in category 5 may have other personal problems and they will probably need repeated group or individual counseling.

- Category 6 is defensive and, therefore, likely to be the most difficult to approach.

Facilitators should stress that, by categorizing the answers in this way, the participants are able not only to identify the more common reasons, but at the same time acquire an insight into how they could attack the problem.

Group work

Let each group prepare a plan for data analysis and interpretation for their own research proposal, using the outline given in the module.

Plenary

Ask each group to present one data master sheet, two or three dummy cross-tabulations, and rough estimates of manpower, time, and materials required for data processing and analysis.

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 14:

PRETESTING THE METHODOLOGY

Steps in the development of an HSR proposal

Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data-collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 14: PRETESTING THE METHODOLOGY

OBJECTIVES

At the end of this session, you should be able to:

1. **Describe** the components of a pretest or pilot study that will allow you to test and, if necessary, revise your proposed research methodology before starting the actual data collection.
2. **Plan** and **carry out** pretests of research components for the proposal being developed.

What is a pretest or pilot study of the methodology?

A PRETEST usually refers to a small-scale trial of a particular research component.

A PILOT STUDY is the process of carrying out a preliminary study, going through the entire research procedure with a small sample.

WHY do we carry out a pretest or pilot study?

A pretest or pilot study serves as a trial run that allows us to identify potential problems in the proposed study. Although this means extra effort at the beginning of a research project, the pretest or pilot study enables us, if necessary, to revise the methods and logistics of data collection before starting the actual fieldwork. As a result, a good deal of time, effort, and money can be saved in the long run. Pretesting is simpler and less time consuming and costly than conducting an entire pilot study. Therefore, we will concentrate on pretesting as an essential step in the development of the research projects.

What aspects of your research methodology can be evaluated during pretesting?

1. **Reactions of the respondents to the research procedures** can be observed in the pretest to determine:

    - availability of the study population and how respondents' daily work schedules can best be respected;
    - acceptability of the methods used to establish contact with the study population;
    - acceptability of the questions asked; and
    - willingness of the respondents to answer the questions and collaborate with the study.

2. The **data-collection tools** can be pretested to determine:

    - Whether the tools you use allow you to collect the information you need and whether those tools are reliable. You may find that some of the data collected are not relevant to the problem or are not in a form suitable for analysis. This is the time to decide not to collect these data or to consider using alternative techniques that will produce data in a more usable form.

    - How much time is needed to administer the questionnaire, to conduct observations or group interviews, and to make measurements.

    - Whether there is any need to revise the format or presentation of questionnaires or interview schedules, including whether:

        - The sequence of questions is logical,
        - The wording of the questions is clear,
        - Translations are accurate,
        - Space for answers is sufficient,

  - There is a need to precategorize some answers or to change closed questions into open-ended questions,
  - There is a need to adjust the coding system, or
  - There is a need for additional instructions for interviewers (e.g., guidelines for "probing" certain open questions).

3. **Sampling procedures** can be checked to determine:

   - Whether the instructions to obtain the sample are followed in the same way by all staff involved.
   - How much time is needed to locate individuals to be included in the study.

4. **Staffing and activities of the research team** can be checked, while all are participating in the pretest, to determine:

   - How successful the training of the research team has been.
   - What the work output of each member of the staff is.
   - How well the research team works together.
   - Whether logistical support is adequate.
   - The reliability of the results when instruments or tests are administered by different members of the research team.
   - Whether staff supervision is adequate.

   The pretest can be seen as a period of extra training for the research team in which sensitivity to the needs and wishes of the study population can be developed.

5. **Procedures for data processing and analysis** can be evaluated during the pretest. Items that can be assessed include:

   - Appropriateness of data master sheets and dummy tables and ease of use.
   - Effectiveness of the system for quality control of data collection.
   - Appropriateness of statistical procedures (if used).
   - Clarity and ease with which the collected data can be interpreted.

6. The proposed **work plan and budget for research activities** can be assessed during the pretest. Issues that can be evaluated include:

   - Appropriateness of the amount of time allowed for the different activities of planning, implementation, supervision, coordination, and administration.
   - Accuracy of the scheduling of the various activities.

When do we carry out a pretest?

You might consider:

- Pretesting at least your data-collection tools, either during the workshop, or, if that is impossible, immediately thereafter, in the actual field situation.

- Pretesting the data-collection and data-analysis process 1-2 weeks before starting the fieldwork with the whole research team (including research assistants) to allow time for revisions.

Which components should be assessed during the pretest?

1. Pretest during the workshop

Depending on how closely the pretest situation resembles the area in which the actual fieldwork will be carried out, it may be possible to pretest:

- The reactions of respondents to the research procedures and to questions related to sensitive issues.
- The appropriateness of study type(s) and research tools selected for the purpose of the study (e.g., validity: Do they collect the information you need?; and reliability: Do they collect the data in a precise way?).
- The appropriateness of format and wording of questionnaires and interview schedules and the accuracy of the translations.
- The time needed to carry out interviews, observations or measurements.
- The feasibility of the designed sampling procedures.
- The feasibility of the designed procedures for data processing and analysis.

Even if you cannot assess all these components fully, the field experience will provide information that will be quite valuable to you when reviewing the methodological aspects of your proposal and when developing your work plan and budget.

2. Pretest in the actual research area

All the issues mentioned above may have to be reviewed again during a pretest in the actual field situation. Other issues, such as the functioning of the research team, including newly recruited and trained research assistants, and the feasibility of the work plan, can only be tested in the research area. An important output of the pretest should be a fully developed work plan.

If choices have to be made as to what to include in the pretest, the following considerations may be helpful:

- **What difficulties do you expect in the implementation of your proposal?** Think of possible sources of bias in data-collection techniques and sampling and ethical issues you considered during the preparation of your plan for data collection (**Module 12**). Can some of these potential problems be overcome by adapting the research design?

- **If you feel you have little experience with a certain data-collection technique** you may want to do some extra practice during the pretest.

- **Which parts of your study will be most costly and time consuming?** Questionnaires used in large surveys, for example, should always be tested. If many changes are made the instruments should be pretested again. If a questionnaire or interview schedule has been translated into a local language, the translated version should be pretested as well.

Note
It is highly recommended that you analyze the data collected during the pretest right away. Then finalize and adjust the master sheets, if necessary. Make totals for each variable included in the master sheets. Fill in some dummy tables and prepare all the dummy tables you need, considering your research objectives.

Do all this even if you plan to analyze the data by computer. You will detect shortcomings in your questionnaires that you can still correct!

Who should be involved in the pretest or pilot study?

- The research team, headed by the principal investigator.
- Any additional research assistants or data collectors that have been recruited.

How long should the pretest or pilot study last?

The time required for a pretest or pilot study will be determined by a number of factors:

- The size and duration of the research project. (The longer the study will take, the more time you might reserve for the test run.)
- The complexity of the methodology used in the research project.

Keep in mind that this is the last chance you will have to make adjustments that will help to ensure the quality of your fieldwork. If you have a 20-day fieldwork period, you might reserve at least 3-5 days for pretesting your data-collection tools, analyzing the results of the pretest, finalizing your tools, and elaborating the work plan.

GROUP WORK I: To prepare the pretest during the workshop (1-1½ hours)

Only half a day will be available for conducting a pretest of your methodology during the course:

1. **Determine what parts of the methodology you would like to test. Include all data-collection tools, if possible.**

2. **Decide with your facilitator and course manager where in the local area you could best carry out the pretest.**

3. **Decide which members of your team will conduct various aspects of the pretest. You are advised to work in pairs, so that you can discuss observations during the pretest.**

4. **Prepare a short list of questions you wish to answer during the pretest. (See Annex 14.1 for suggestions.)**

GROUP WORK II: After completion of the pretest (4 hours)

1. Answer the questions you developed for the pretest.
2. Determine whether your pretest experience indicates that you need any:
   - Changes in your research proposal, or
   - Changes in your data-collection tools.

   Assign various group members to make these changes.
3. Determine what aspects of the study you would like to pretest (again) in your research area and why, with whom, when, and where.
4. After completing items 1-3, summarize the major points on a flip chart and in one or two paragraphs for your research proposal.

GROUP WORK III (instead of group work I and II, if no pretest is possible during the workshop, 3 hours)

1. Decide what aspects of the study you would like to test in your research area and why, with whom, when, and where. Summarize this information in one or two paragraphs in your research proposal.
2. Instead of doing a pretest during the workshop, you might at this point of time carefully review your research methodology and your data-collection tools, using Annex 14.2.

Annex 14.1. Summary of points to assess during a pretest or pilot study

1. **Reactions of respondents to your research procedures**	Acceptable	Not acceptable	Suggestions
Availability of sample needed for full study			
Work schedules of population that may affect their availability			
Desire of population to participate			
Acceptability of questions			
Clarity of the language used			

2. **The data-collection tools**	Acceptable	Not acceptable	Suggestions
Whether the tools provide the information you need and are reliable			
Time needed for administering each of the data-collection tools			
Presentation of questions and format of questionnaire			
Accuracy of translation			
Precategorizing of questions			
Coding system and coding guidelines			
Handling and administering the tools			

3. **Sampling procedures**	Acceptable	Not acceptable	Suggestions
Whether the instruction to obtain the sample are used uniformly by all staff			
Time needed to locate the individuals to be included in the study			

4. **Preparation and effectiveness of research team**	Acceptable	Not acceptable	Suggestions
Adequacy of staff training			
Output of each team member			
Team dynamics			
Reliability of tools when administered by different team members			
Accuracy of interpretation			
Appropriateness of plan for supervision			

5. **Procedures for data processing and analysis**	Acceptable	Not acceptable	Suggestions
Use of data master sheets			
Effectiveness of data quality control			
Appropriateness of statistical procedures			
Ease of data interpretation			

6. **Schedule for research activities**	Acceptable	Not acceptable	Suggestions
Amount of time allowed for: • field trips for data collection			
• supervision			
• administration			
• analysis of data			
Sequence of activities			

Annex 14.2. Summary of possible fallacies in the design and implementation of studies

As we have now gone through all steps of the study design, including the planning of data processing and analysis, it may be useful to summarize the critical points at which a researcher can go wrong:

- In the SELECTION of RESPONDENTS or study elements, and
- In the COLLECTION of data.

These potential errors should be reviewed while you are pretesting your research methodology.

Errors in selection of respondents or study elements

In the selection of respondents we may distinguish several major possibilities for error.

Too limited (or inappropriate) definition of the study population or use of incorrect sampling procedures, for example by:

- Studying registered patients only;
- Obtaining responses from male opinion leaders only (if one needs the opinion of the whole community);
- Choosing a sample because it is close to a road or in some other way easier to access (tarmac bias); or
- Conducting the study during only one season of the year (when results may be biased by not including other seasons or because access is difficult).

Errors in the assignment of research subjects to study groups in analytic and experimental studies:

- Defective matching in case-control studies;
- The inclusion of volunteers for study groups in cohort studies;
- Nonrandomization in experimental studies; or
- If randomization is impossible, failure to develop a quasiexperimental design that corrects as much as possible for "rival explanations."

Selective dropouts or nonresponse

Dropouts or subjects who do not respond to selected questions may represent a special category of respondents. If attrition is high or the rate of nonresponse excessive, results may be biased.

In cohort studies, follow-up of individuals can pose problems. Bias in follow-up results if there is a differential dropout between those exposed to the risk and those without exposure.

Errors in data collection

We may obtain:

Invalid data, by applying indicators and measuring techniques or instruments that do not adequately measure what we want to measure.

Unreliable data due to:

- Variation in the characteristics of the research subject measured, as a consequence of the research;
- The use of unstandardized measuring instruments; or
- Differences between observers and interviewers.

Reliability of data collected is always required, but it is of crucial importance if we want to measure changes over time. If we find changes we must be sure that these are not caused by errors in our research methods that could have been prevented.

All the above-mentioned shortcomings may threaten the **validity** of your findings and conclusions. The shortcomings can be prevented to some degree by being alert to them when designing and implementing the study; otherwise they have to be mentioned in the study design.

Module 14: PRETESTING THE METHODOLOGY

Timing and teaching methods

½ hour	Introduction and discussion
1½ hours	Group work I (to prepare the pretest)
4 hours	Actual pretest
4 hours	Group work II (to discuss pretest results and revise the data-collection tools)
1 hour	Plenary
11 hours	TOTAL TIME

Note: If no pretest can be carried out during the workshop, consider using group work III (3 hours) as an alternative to group work I and II.

It is important to note that well before this session (preferably after **Module 10**) the course manager should ask the groups what data collection tools they want to pretest and on whom. Each research team, with the assistance of its facilitator, should decide how many interviews or observations will be conducted and should begin making arrangements for obtaining necessary copies of the instruments and other supplies needed. The course manager should make arrangements for all the groups (i.e., look for suitable sites to do the pretest, inform (health) authorities or local leaders of the plans, ask for their consent, and arrange transport).

Introduction and discussion

- Discuss the concept and process of pretesting or conducting a pilot study of the methodology, covering the questions posed in the module.

- Refer to Annex 14.1, Summary of points to assess during a pretest or pilot study. Using the annex, review briefly the important aspects of pretesting covered in the presentation.

- Discuss the pretest that will be undertaken during the workshop and make sure that each research team knows where they are going to do the pretest and whom they are going to meet. Explain how much time they have for the preparation of the pretest (group work I), the actual pretest, its evaluation (group work II), and for reporting and discussion in plenary. Stress the importance of working in pairs during the pretest, so that experiences can be shared.

- Emphasize that it is important to make notes of all observations during the pretest so that they can be discussed afterwards.

Group work I

Ask the participants to meet in their working groups to design the pretest for their project.

Pretest field exercise

If necessary, an instruction sheet should be prepared for the field exercise including information such as:

- How the field exercise will be organized, i.e.:
    - Where each working group will go;
    - What pairs of participants will work together;
    - What formalities need to be observed with community leaders, directors of health facilities, and respondents;
    - What explanation should be given concerning the purpose of the pretest and whether any feedback will be given to those participating as respondents;
    - How many interviews or observations should be conducted;
    - Time available for the exercise, etc.
- Points that should be assessed during the field test. (These could include some or all of the points listed in Annex 14.1.)
- When and where the working groups should reassemble after the field exercise for the group work II session.

Group work II

Arrange for each group to meet after they have come back from the field to discuss and analyze their experiences and to revise their data-collection tools and possibly other aspects of the research methodology. Ask each group to prepare a short report of their main findings and conclusions.

Plenary

One member of each group should report in plenary on the main findings and conclusions of the pretest.

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 15:

WORK PLAN

Steps in the development of an HSR proposal

Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data-collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 15: WORK PLAN

OBJECTIVES

At the end of this session, you should be able to:

1. **Describe** the characteristics and purposes of various project planning and scheduling techniques such as "work scheduling" and "GANTT charting."
2. **Determine** the staff you need for the various tasks in your project and describe why you need additional staff (research assistants, data collectors, or supervisors) apart from the research team that developed the proposal, where you will recruit them, for how long a period you need them, and how you will train and supervise them.
3. **Prepare** a work schedule, GANTT chart, and staffing plan for the project proposal you are developing.

I. Introduction

II. Various work scheduling and planning techniques

I. INTRODUCTION

What is a work plan?

A WORK PLAN is a schedule, chart, or graph that summarizes, in a clear fashion, various components of a research project and how they fit together.

It may include:

- The tasks to be performed;
- When the tasks will be performed; and
- Who will perform the tasks and the time each person will spend on them.

II. VARIOUS WORK SCHEDULING AND PLANNING TECHNIQUES

1. The work schedule

A WORK SCHEDULE is a table that summarizes the tasks to be performed in a research project, the duration of each activity, and the staff responsible.

The version of a work schedule given on the following page includes:

- The tasks to be performed;
- The dates each task should begin and be completed;
- Research team, research assistants, and support staff (drivers and typists) assigned to the tasks; and
- Person-days required by research team members, research assistants, and support staff (the number of person-days equals the number of working days per person).

Note:

The period for field research for the course project should not exceed 6 months. Week 1 is the first week after completion of the present workshop.

This work schedule was developed for a study of factors contributing to low utilization of child-spacing (C/S) services in a certain region. The research team consisted of four persons (mainly regional health team members). The study consisted of two main parts: (1) analysis of the child-spacing records to assess the percentage of C/S users and the regularity with which they use the services, and interviews with staff responsible for the services; and (2) interviews with female users of C/S services (sampled from the records) and nonusers, and interviews with husbands of female users of C/S and of nonusers.

EXAMPLE OF WORK A SCHEDULE: CHILD-SPACING STUDY (C/S)

Tasks to be performed	Dates	Personnel assigned to task	Person days required
1. Finalize research proposal and literature review	week 1-3 4-24 Apr.	Research team (4)	4 × 3 = 12 days
2. Clearance from national and funding authorities	week 1-5 4 Apr.-8 May	Research unit - ministry of health	
3. Clearance and orientation of local authorities	week 6 9-15 May	PI (Regional Health Officer) Driver	2 days 2 days
4. Compilation of child spacing records and interviews of C/S staff	week 6-9 9 May-5 June	Public health nurse Driver	10 days 10 days
5. Analysis of C/S records and sampling study units	week 10 6-12 June	Research team Secretary	4 × 2 = 8 days 1 day
6. Training of research assistants and field testing questionnaire	week 11 13-19 June	Research team Research assistant(s) Facilitator	4 × 3 = 12 days 5 × 3 = 15 days 1 × 4 = 4 days
7. Interviews in community	week 12-13 20 June-3 July	Research team Reasearch assistants	4 × 10 = 40 days 5 × 10 = 50 days
8. Preliminary data analysis	week 19-22 8-28 Aug.	Research team Research assistants Facilitator	4 × 7 = 28 days 5 × 1 = 5 days 1 × 2 = 2 days
9. Feedback to local authorities and district health teams	week 27 3-9 Oct.	Research team Driver	4 × 1 = 4 days 2 days
10. Feedback to communities	week 28 10-16 Oct.	Research team Driver	4 × 1 = 4 days 1 day
11. Data analysis and reporting workshop	week 29-30 17-30 Oct.	Research team Facilitator	4 × 10 = 40 days 1 × 10 = 10 days
12. Report finalization	week 31-34 31 Oct.-28 Nov.	Research team Secretary	4 × 2 = 8 days 1 × 5 = 5 days
13. Discussion of recommendations/plan of action with local authorities and districy health teams	week 36-37 12-25 Dec.	Research team Secretary Driver	4 × 3 = 12 days 3 days 3 days
14. Monitoring research project	continuous	Research team	4 × 1 = 4 days

You will notice that, if the workshops are excluded, each team member roughly spent 30 working days on the research, except the regional public health nurse. She visited all centres with C/S services in the region to analyze the records and interview staff. Although she integrated these tasks with her normal supervisory duties, she spent about 10 working days more than the other team members. Five research assistants (two community health nurses and three district health Inspectors) were recruited to assist with the interviewing. The number of working days required was multiplied by four (for the research team) and five (for the research assistants) to arrive at the number of person-days.

How to develop a work schedule

- Review and revise, if necessary, the list of tasks you prepared for your plan for data collection (Module 12). Add to the list other tasks you must complete not related to data collection (such as clearance of proposal; data analysis and report writing; and feedback to authorities and target group). Number all tasks.

- Now review the staffing for the different tasks, taking into account your experience during the pretest. Consider:

    - Who will carry out which tasks;
    - The amount of time needed per research unit (interview/observation/record) including travel time; and
    - The number of staff needed to complete each task in the planned period of time.

  Make revisions, if required. Complete the staffing for the tasks you have just added.

- Consider whether the use of short-term consultants is necessary for certain tasks. Always consider using local consultants. If consultants are used, involve them in the planning stage of the project so you can incorporate any useful suggestions they may have concerning the design of the methodology.

In reviewing your tentative staffing plan you should ask:

- Are the types of personnel and levels of expertise you require likely to be available for the project? For example, is there a sufficient range of disciplines available including, where appropriate, personnel from outside the health field?

- If special staff have to be recruited or reassigned from other ministries or agencies, what regulations or procedures will have to be followed?

- Is the staffing plan realistic, taking into account the project budget that is likely to be available?

- To what extent can community members, traditional healers, students, or other nonprofessionals be involved in the study?

- What training would the research assistants or data collectors require? How long would the training last? Who would do the training? How do you intend to supervise the assistants and data collectors? Review what you have tentatively planned in Module 12 and revise it, as necessary.

Then fix the dates (in weeks) indicating the period in which each task will have to be carried out and calculate the number of working days per person required to complete each task.

2. The GANTT chart

The GANTT chart is a planning tool which depicts graphically the order in which various tasks must be completed and the duration of each activity.

The GANTT chart shown on the following page indicates:

- the tasks to be performed;
- who is responsible for each task; and
- the time each task is expected to take.

The length of each task is shown by a bar that extends over the number of days, weeks or months the task is expected to take.

How can a work plan be used?

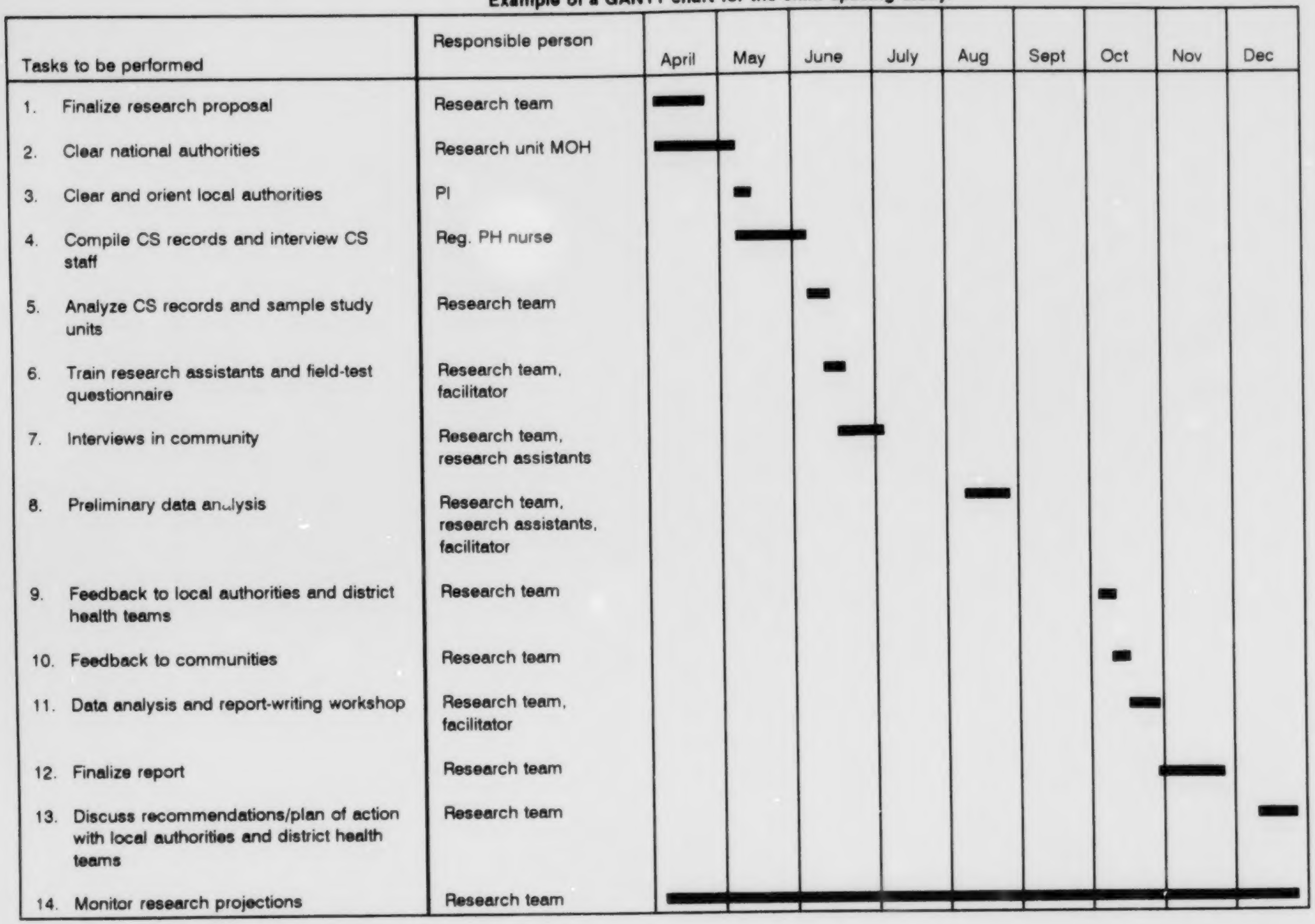
A work plan can serve as:

- A tool in planning the details of the project activities and later in budgeting funds.
- A visual outline or illustration of the sequence of project operations. It can facilitate presentations and negotiations concerning the project with government authorities and other funding agencies.
- A management tool for the principal investigator and members of his or her team, showing what tasks and activities are planned, their timing, and when various staff members will be involved in various tasks.
- A tool for monitoring and evaluation, when the current status of the project is compared to what had been foreseen in the work plan.

When should the work plan be prepared and when should it be revised?

- The first draft of the work plan should be prepared when the project proposal is being developed, so the schedule can be discussed easily with the relevant authorities.
- A more detailed work plan should be prepared after the pretest in the study area.

Example of a GANTT chart for the child spacing study.



Tasks to be performed	Responsible person	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1. Finalize research proposal	Research team	■								
2. Clear national authorities	Research unit MOH	■	■							
3. Clear and orient local authorities	PI		■							
4. Compile CS records and interview CS staff	Reg. PH nurse		■	■						
5. Analyze CS records and sample study units	Research team			■						
6. Train research assistants and field-test questionnaire	Research team, facilitator			■						
7. Interviews in community	Research team, research assistants			■	■					
8. Preliminary data analysis	Research team, research assistants, facilitator					■				
9. Feedback to local authorities and district health teams	Research team							■		
10. Feedback to communities	Research team							■		
11. Data analysis and report-writing workshop	Research team, facilitator							■		
12. Finalize report	Research team								■	
13. Discuss recommendations/plan of action with local authorities and district health teams	Research team									■
14. Monitor research projections	Research team	■	■	■	■	■	■	■	■	■

- There should be no hesitation in revising work plans or preparing new ones after the project is underway based on a reassessment of what can be realistically accomplished in the coming months.

What factors should be kept in mind when preparing a work plan?

- It should be simple, realistic, and easily understood by those directly involved.
- It should cover the preparatory and the implementation phases of the project, as well as data analysis, reporting, and dissemination/utilization of results.
- The activities covered should include technical or research tasks; administrative, secretarial, and other support tasks; and training tasks.
- The realities of local customs (local holidays, festivals) and working hours should be considered when preparing the work plan.
- Also seasonal changes and their effect on travel, work habits, and on the topic you are studying (such as incidence of disease or nutritional status) should be kept in mind as the schedule is planned.

GROUP WORK (3 hours)

Prepare a work plan for inclusion in your proposal, following the steps below:

1. Start with the development of a work schedule:
   - List all tasks to be carried out, completing and revising the list of tasks you prepared for your plan for data collection.
   - Consider who will carry out each tasks, the number of working days required per person to complete each task, the number of staff you will need to finish each task in a given period of time, and the period in which you plan to actually carry out each task.
   - Look at a calendar and note any public holidays or other important activities scheduled for the period (about 6 months) in which you plan to conduct the fieldwork.
   - Include your facilitator in stages of the fieldwork where you feel you would require assistance and, if needed, also schedule the use of a local consultant.
   - Do not forget to include support staff required (typists, drivers, for example).
2. Consider whether the number of days each member of the research team plans to invest in the fieldwork will be acceptable. (It should most likely not exceed 30 working days.)

GROUP WORK (continued)

3. Prepare a GANTT chart to include in your proposal.
4. Include two or three paragraphs on the staff required for your research and their tasks in your work plan, including:
    - Composition of research team itself and the tasks of various members;
    - Reasons for recruiting research assistants/data collectors/supervisors, where you will recruit them, what their tasks will be, for how long you will need them, and how you will train and supervise them (completing and revising what you have already prepared in your plan for data collection);
    - The role of facilitators during the fieldwork and when they will be needed; and
    - Whether any other consultants will be needed and, if so, what skills they should have and what their tasks would be.
5. Copy your work schedule and GANTT chart on flip charts or overhead sheets, for use in the exercise below and in the plenary discussion.

EXERCISE (optional): Project work plan

Review the work plan developed by another group for their research proposal and provide constructive criticism.

Module 15: WORK PLAN

Timing and teaching methods

½ hour	Introduction and discussion
3 hours	Group work
1/4 hours	Exercise (optional)
1 hour	Plenary
4 ½ hours	TOTAL TIME

Introduction and discussion

- Introduce and discuss the aims and uses of a work plan, encouraging participants who have experience in making work plans to contribute actively.

- Pay special attention to the concept of person-days. It is important that everyone understands the concept as the groups need to calculate the number of person-days for various tasks when making their work plans as well as preparing the budgets for their research proposals.

- The importance of having a detailed and realistic work plan which is at the same time flexible should be stressed.

Group work

Ask the participants to prepare a work plan for their research proposal taking into account the plan for data collection that they already prepared (Module 12). Ask them to start by listing the tasks to be performed in the correct sequence. Then they should estimate the time involved for each task and assign the tasks to various staff members and consultants (if needed). Encourage each group to think seriously about what staffing pattern would be most cost-effective and efficient for their particular research project.

Exercise: Project work plan (optional)

Have each group look at the work plan developed by one of the other groups and provide constructive criticism.

Plenary

Have each group present its work schedule, GANTT chart, and staffing plan followed by a short discussion.

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Module 16:

PLAN FOR PROJECT ADMINISTRATION, MONITORING, AND UTILIZATION OF RESULTS

Steps in the development of an HSR proposal

Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data-collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 16: PLAN FOR PROJECT ADMINISTRATION, MONITORING, AND UTILIZATION OF RESULTS

OBJECTIVES

At the end of this session, you should be able to:

1. **List** the responsibilities of the principal investigator related to the administration and monitoring of an on-going project.
2. **Prepare** a brief plan for administration and monitoring of the research project being developed.
3. **Prepare** a plan for actively disseminating and fostering the utilization of results for the project proposal being developed.

I. Administering research projects

II. Project monitoring

III. Planning for the utilization and dissemination of research results

I. ADMINISTERING RESEARCH PROJECTS

What is project administration?

Project administration is the term for all the activities involved in managing the human, material, financial, and logistical resources of a project.

Why is good administration important in a research project?

- It allows for orderly and accurate purchase and procurement of equipment, payment of bills, and preparation of financial reports.
- It allows researchers to foresee the need for funds and to make timely requests to avoid unwanted breaks in the implementation of the project.
- It allows researchers to devote most of their time to the technical and scientific aspects of the project.

What administrative issues should be considered as the project proposal is being finalized?

As a team developing a research project, you should now consider the following issues:

- One of the team members should be selected by you as **principal investigator** (PI). A principal investigator is the "first among equals"; he or she is ultimately responsible for implementing the proposal as planned and for solving possible problems that may arise. The PI is the team's representative for official contacts with the ministry of health and with other relevant (funding, research, or service) institutions.
- An organizational unit or official has to be identified, outside the team, who has the power to receive and handle funds: a **principal administrator**. The research team has to consider what service unit is best able to:
    - work in collaboration with the principal investigator and funding authorities to ensure an adequate flow of funds, including petty cash for minor expenses; and
    - avoid creating unnecessary bureaucratic or administrative difficulties that may hinder implementation of the study.
- Procedures for ensuring the smooth procurement and flow of funds should have been worked out before the workshop by the ministry of health, the course management team, and possible external donors, so that the research teams can start working immediately after official approval has been obtained. Because the documents that must be prepared as part of these procedures require the signatures of the principal investigator and principal administrator, they need to be finalized during the workshop.

What would the tasks of the principal investigator, related to project administration, include?

- Supplying the principal administrator or the administrative team with a copy of the research proposal and making sure they understand the work of the researchers and when funds are needed.

- Alerting administrative officials in a timely fashion concerning staff, materials, equipment, and funds needed during various stages of the project.

- Supervising the flow of funds, project accounting, and preparation and submission of financial reports.

- Discussing with the relevant authorities in the Ministry of Health (Health Research Unit, for example) any difficulties encountered in the project and attempting to identify appropriate solutions.

What administrative operations need to be supervised by the principal investigator at the end of the project?

- Working with project administration to plan for end-of-project activities, such as making an inventory of leftover supplies and equipment and dispensing them, if required, and arranging for any final payments and financial accounting.

- Overseeing the preparation and distribution of the final administrative and financial report.

- Making sure that all financial obligations are met.

II. PROJECT MONITORING

What is project monitoring?

MONITORING is the on-going process by which information is gathered concerning the implementation and evolution of the research project. Monitoring involves activities designed to keep track of resources available and used and the quantity and quality of the operations carried out during each phase of the project.

Monitoring should continue throughout the project and be organized so that it is helpful in alerting staff to problems that develop and changes needed. It is a valuable management and learning tool for everyone concerned.

What should be reviewed during monitoring sessions?

- The resources needed for the project, including staff, equipment, supplies, logistical support, and funds, to assess if they are available when needed and being appropriately used;
- The activities of each team member and their relations to the project as a whole, to assess if the work plan is being carried out as planned and what delays or difficulties, if any, have emerged that need to be addressed;
- The flow and quality of the data that are being collected; and
- The communication and coordination of the research team with the study population, other collaborating groups, and funding authorities.

Note:

Monitoring will usually take place at team meetings during field activities. If there is a gap in the fieldwork, it may be necessary to convene a special meeting.

It is advisable to keep close track of changes in the work plan and problems encountered and solved (or unsolved) so that you can inform your facilitator and superiors, and include this information in your preliminary report (Module 20).

III. PLANNING FOR THE UTILIZATION AND DISSEMINATION OF RESEARCH RESULTS

Before you finish drafting your research proposal you should start planning how the results of your study could be used.

Why should the researcher be concerned about utilization and dissemination of research results?

The fundamental reason for undertaking health systems research is to obtain results that can be used to improve health and health care.

Who will be interested in the results?

Depending on the topic you selected, the results may be useful to the community, to staff and managers of health and health-related services, and to researchers and donor agencies in your own country as well as others.

However, above all, you as a research team and your program should keep the results, as you have developed the proposal to help solve one of your own priority problems.

What strategies can you follow to ensure that the results of your study will be used?

1. **Involve relevant authorities, staff, and community members in the selection of your topic and in the definition of your problem.**

   If possible, these groups should be consulted before the proposed development workshop begins. If the final decision for a certain topic is made during the workshop, however, not all parties concerned may have been consulted. If not, they should be consulted immediately after the workshop.

2. **List the major types of recommendations you expect to obtain from your study and identify who should be involved in their implementation.**

   Here we must distinguish between two categories of people who should be involved:

   - Those who authorize you to implement the recommendations, and
   - Partners in the implementation process.

   Most likely you will be authorized to implement certain recommendations yourself, but for others you will need the approval of your superiors or of decision-makers from other sectors. Some authorities may merely need to give their approval, but you may need the active collaboration of others during the application of the results. Furthermore you will need to identify from which colleagues, subordinate staff, and target groups in the community cooperation will be required for the implementation of the study's recommendations.

3. **Identify which communication channels already exist which can be used to disseminate results.**

   Channels for disseminating results may include, for example:

   - Provincial or district development team meetings;
   - Provincial or district health team meetings;
   - Supervisory visits to health facilities involved; staff meetings;
   - Mobile clinics or other health activities carried out in villages included in the study; monthly meetings of village health workers to collect drugs; meetings of village health committees.

   Keep relevant parties informed of progress during project implementation and plan to obtain their input when study findings and recommendations are drafted.

4. **Determine what written materials should be prepared to keep relevant parties informed.** They may include:

   - A 1- to 2-page summary of your project proposal, which includes details on expected results, to distribute when you introduce the project to policymakers and staff concerned.

   - An introductory statement to use with interview schedules and questionnaires, explaining to informants the purpose and procedures of the study as well as expected results. This could also be used when you introduce the project to policymakers in the village.

- A progress report of 4-5 pages including preliminary findings and recommendations that you will prepare for presentation at the data analysis and report writing workshop. This report can also be used to inform authorities who will be crucial to utilization of project results.

- The draft report of findings and recommendations, prepared during the data analysis workshop. The summary of this report can be used for discussion with policymakers and staff. However, for decision-makers and target groups in the community, you will need a different summary, concentrating in simple words on the findings and recommendations that directly concern them.

Make sure that summaries of your findings and recommendations are adapted to the level of understanding and interests of different audiences. This will increase their motivation to provide feedback and to participate in the implementation of the final recommendations.

5. **Determine whether additional actions should be taken or mechanisms developed to inform all parties concerned of study results and obtain their approval and cooperation for the implementation of the recommendations.** These may include, for example:

- Special visits to top policymaker(s) by the principal investigator or the whole research team to report on progress during the fieldwork or to discuss preliminary results and recommendations.

- The invitation of the one or two most crucial persons for implementation of your recommendations to the last day of the data analysis workshop, when you will present your findings and recommendations in plenary.

- Special meetings with policymakers, staff, and representatives of the target groups concerned to discuss the findings and recommendations of the study and develop a plan for action.

For complex projects of relative long duration, it may be advisable to have a Project Advisory Committee, representing the major parties involved. Because the projects developed during workshops will, in general, not last longer than 6 months, you may be able to keep key individuals or representatives informed through ad hoc or even routine meetings.

Do not forget to report the findings to the subjects/community/organization studied before the report is finalized. This should be done to fulfil an obligation to those studied, to obtain information on possible errors in your draft report, and to discuss your proposed recommendations and obtain useful feedback.

GROUP WORK (1 1/2 hours)

1. Develop a plan for administering and monitoring your project. Consider the following questions as you develop your plan:

   Administration
   - Who will be the principal investigator for your project?
   - Which organizational unit or which official would be best able to administer the project? (Remember that the principal investigator cannot also be the principal administrator.)
   - Which authorities are likely to fund the project?
   - How can a smooth flow of funds be assured?
   - Who will do the project accounting and file and submit receipts?

   Monitoring
   - What aspects of the project will be monitored and who will be responsible?
   - How will the monitoring activities be organized and when will they take place?

2. Prepare a summary of your plan for administration and monitoring on a flip chart for presentation in plenary and compose a short written description for inclusion in your project proposal.

3. List the major recommendations expected from your study in a table and identify who should be involved in their implementation:

Expected recommendations	Is the research team authorized to implement the recommendations?	Is authorization required? If so, from whom?

4. Determine what channels or mechanisms you will use (or develop) to keep parties from whom you require authorization or cooperation for implementing recommendations informed concerning the project (1) before starting the field work; (2) after completing the fieldwork; (3) after preparing the draft report of findings and recommendations.

5. Identify the one or two authorities who are most crucial for implementation of your recommendations so that they can be invited for the presentation and discussion of your findings and recommendations during the data analysis workshop.

6. Present the results of your group work on a flip chart and prepare several paragraphs on project administration and monitoring and the utilization of results for inclusion in your research proposal. Do not forget to include the dissemination and utilization of the results in your work plan and, if necessary, in the budget.

Trainer's Notes

Module 16: PLAN FOR PROJECT ADMINISTRATION, MONITORING AND UTILIZATION OF RESULTS

Timing and teaching methods

3/4 hour	Introduction and discussion
1 1/2 hour	Group work
1 hour	Plenary
3 1/4 hours	TOTAL TIME

Introduction and discussion

- Give a brief overview of the topics that will be covered in the presentation.
- Stress that the principal investigator is not necessarily the most senior group member, but should be the best organizer.
- Give a brief introductory presentation on project administration and monitoring and its importance. Highlight administrative activities that should be undertaken by the principal investigator before, during, and at the end of the research project.

  It is important to discuss how a smooth flow of project funds can be guaranteed. These procedures should have been agreed upon with the relevant authorities in the ministry of health and with possible external donors before the workshop.
- Introduce and discuss the importance of drafting a plan for the utilization and dissemination of research results and what such a plan should contain.

Group work

Ask the participants to meet in their working groups and develop a plan for project administration, monitoring, and utilization of results. A brief summary should be made for presentation in plenary and for inclusion in the research proposal.

Plenary

Have each group present its plan for project administration, monitoring, and utilization of results, followed by discussion.

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 17:

BUDGET

Steps in the development of an HSR proposal

Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data-collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	

N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 17: BUDGET

OBJECTIVES

At the end of this session, you should be able to:

1. **Select** or develop appropriate major categories for a budget.
2. **Make** reasonable estimates of the expenses in various budget categories.
3. **List** various ways a budget can be reduced, if necessary, without substantially damaging a project.
4. **Prepare** a realistic and appropriate budget for the project proposal being developed during the course.

Why do we need a budget?

- A detailed budget will help you to identify which resources are already locally available and which additional resources may be required.
- The process of budget design will encourage you to consider aspects of the work plan you have not thought about before and will serve as a useful reminder of activities planned, as your research gets underway.

When should budget preparation begin?

A complete budget is normally not prepared until the final stage of project planning. However, cost is usually a major limiting factor and, therefore, must always be kept in mind during planning so that your proposals will not have an unrealistically high budget. (See Module 4, Analysis and statement of the problem.) Remember that both ministries and donor agencies usually set limits for research project budgets.

The use of locally available resources increases the feasibility of the project from a financial point of view.

How should a budget be prepared?

It is convenient to use the work plan as a starting point. Specify, for each activity in the work plan, what resources are required. Determine for each resource needed the **unit cost** and the **total cost**.

Example:

In the work plan of a study to determine the utilization of family planning methods in a certain district, it is specified that 5 interviewers will each visit 20 households in clusters of 4 over a time period of 5 working days. A supervisor will accompany one of the interviewers each day using a car. The other 4 interviewers will use motor cycles. The clusters of households are scattered over the district but are on average 50 kilometres from the district hospital from where the study is conducted.

The budget for the field work component of the work plan will include funds for personnel, transport and supplies.

Note that UNIT COST (e.g., per diem or cost of petrol per km), the MULTIPLYING FACTOR (number of days), and TOTAL COST should be clearly indicated for all budget categories.

Table 17.1. Costs involved in fieldwork for a family-planning study.

Budget category	Unit cost	Multiplying factor	Total cost
1. **Personnel**	**Daily wage (including per diem)**	**Number of staff-days (no. staff × no. of working days)**	**Total**
Interviewers	$10	5 × 5 = 25	$250
Supervisor	$20	1 × 5 = 5	$100
		Personnel TOTAL	**$350**
2. **Transport**	**Cost per km**	**Number of km (no. vehicles × no. days × no. km/day)**	**Total**
Motorcycles	$0.10	4 × 5 × 100 = 2000	$200
Car	$0.40	1 × 5 × 100 = 500	$200
		Transport TOTAL	**$400**
3. **Supplies**	**Cost per item**	**Number**	**Total**
Pens	$1.00	12	$12
Questionnaires	$0.20	120	$24
		Supplies TOTAL	**$36**
		GRAND TOTAL	**$786**

If more than one budget source will be used (e.g., the ministry of health and a donor), it would be useful to indicate in the budget which source will pay for each cost. Usually a separate column is used for each funding source. (See Annex 17.1.)

Advice on budget format

An example of a project budget is provided in Annex 17.1. This budget includes the major categories that are usually needed for small projects: personnel, transport, and supplies and equipment.

The type of budget format to be used may vary depending upon whether the budget will be supported by your own organization or the ministry of health or submitted to a donor organization for funding. Most donor organizations have their own special project forms, which include a budget format.

If you intend to seek donor support it is advisable to write to the potential funding organization as early as possible during the period of project development.

Advice on budget preparation

- Keep in mind the tendency to underestimate the time needed to complete project tasks in "the real world." Include a 5% contingency fund if you fear that you might have budgeted for the activities rather conservatively. (If inclusion of a contingency fund is not allowed, an alternative is to slightly over-budget in major categories.)
- Do not box yourself in too tightly with very detailed categories and amounts, especially if regulations do not allow adjustments afterward. Ask the supervising agency to agree that there may be some transfer between "line items" in the budget, if needed.
- If your government or department has agreed to contribute a certain amount for the project, try to arrange that the contribution be administered separately, so that the administrators remain aware of the commitment. This may also ensure easier access to the funds.
- If the budget is for a period longer than a year, build in allowances for inflation before the project begins and in subsequent years by increasing costs by a set percentage. (If inflation is high in the local economy, you may have to build in allowances for even shorter projects.)

Budget justification

It is not sufficient to present a budget without explanation.

The budget justification follows the budget as an explanatory note justifying briefly, in the context of the proposal, why the various items in the budget are required. Make sure you give clear explanations concerning why items that may seem questionable or are particularly costly are needed and discuss how complicated expenses have been calculated. If a strong budget justification has been prepared, it is less likely that essential items will be cut during proposal review.

How can budgets be reduced?

- Explore whether other health-related institutions are willing to temporarily allocate personnel to the project.
- When possible, use local rather than outside personnel. If consultants are needed at the beginning, train local personnel as soon as possible to take over their work.
- Explore the use of students or community volunteers, where appropriate.
- Plan for strict control of project expenditures, such as those for vehicle use, supplies, etc.

Obtaining funding for projects

To conduct research, it is usually necessary to obtain additional funding for the research project. Such funding may be available from local, national, or international agencies. In addition to preparing a good research proposal, the following strategies are useful for researchers who need to obtain their own funding:

1. Familiarize yourself with the policies and priorities of funding agencies. Such policies and priorities may be:

   - explicit, i.e., available from policy documents issued by the agency;
   - implicit, i.e., known to officials in the agency and to other local researchers who have previously been funded by that agency.

   Obtain the names of such persons and make direct contact with them.

   The funding policies of many agencies may emphasize:

   - priority for research aimed at strengthening a particular program (e.g., MCH, PHC);
   - institution building (i.e., building the capacity of an institution to do research);
   - research credibility.

   Annex 17.2 gives a list of some prominent research funding agencies.

2. Identify the procedures, deadlines, and formats that are relevant to each agency.

3. Obtain written approval and support from relevant local and national health authorities and submit this together with your proposal.

4. If you are a beginning researcher, associate yourself with an established researcher. Host agencies scrutinize the "credibility" of the researcher to whom funds are allocated. Such credibility is based on previous projects that have been successfully completed.

5. Build up your own list of successfully completed projects (i.e., your own reports, publications, etc.).

GROUP WORK (2-1/2 hours)

1. Prepare a budget for your project. Keep in mind the importance of having a realistic budget, for which resources can actually be found. (See Annex 17.1 for an example.)

2. Examine the work plan in your project proposal and consider the expenses involved in completing each component. Local rules should be followed for calculating per diems, travel cost, and overtime (if required).

3. Indicate for each item, the UNIT COST as well as the NUMBER OF UNITS. Justify large budget items, travel, and allowances in one or two paragraphs attached to the budget.

4. Consider the "cost-effectiveness" of various budget levels. Will the final results be worth the expense?

5. Consider the budget level that possible funding authorities would consider appropriate:

    - Examine their guidelines.
    - If appropriate, talk with donor representatives about their policies.

6. If additional funding is requested from an outside donor, make clear what contribution the ministry of health and your own institution are making.

ANNEX 17.1. Example of budget for a child-spacing study (in kwachas)

1. **Personnel costs** (excluding workshops)	**Ministry of health**	**Donor**	**Total**
Research team			
88 person-days in provincial capital	Salary		
56 person-days in field			
per diem 56 × K 45	▪	2,520	2,520
Research assistants			
20 person-days in provincial capital			
per diem 20 × K 45	▪	900	900
50 person-days in field			
per diem 50 × K 45	▪	1,750	1,750
Facilitator			
6 person-days in provincial capital			
per diem 6 × K 120		720	720
per diem driver 6 × K 35		210	210
Drivers of project			
18 person-days			
per diem 10 × K 35	▪	630	630
Secretary			
8 person-days	▪		
2 seniors of each of the 5 district hospitals			
11 person-days in provincial capital	▪		
per diem 11 × K 70		770	770
2 senior officials MOH	▪		
4 person-days in provincial capital			
per diem 4 x K 70		280	280
driver per diem 2 x k 35		70	70
SUBTOTAL	4630	7,850	12,480

2. Transport costs	**MOH**	**Donor**	**Total**
Clearance local leaders (340 km)			
Compilation CS records staff interviews (21 clinics) (2100 km)			
Training research assistants and field test (100 km)			
Data collection in 2 districts (1400 km)			
Discussion District Health Teams and HQ authorities (1540 km)			
Facilitators' visits (2880 km)			
TOTAL MILEAGE (8360 km)			
8360 × K 0.35/km for petrol		2,926	2,926
8360 × K 1/km for operating costs	8,360		8,360
Public transport for research assistants		210	210
2 return air tickets for senior MOH staff		450	450
SUBTOTAL	8360	3,586	11,946

3. Supplies	**MOH**	**Donor**	**Total**
12 reams duplicating paper × K 37.50	450		
1 ream writing paper	50		
1 ream photocopy paper	70		
20 folders × K 5	100		
5 writing pads × K 8	40		
Pens, rubbers, etc.	60		
4 boxes stencils × 4.50	200		
5 tubes duplicating ink	110		
SUBTOTAL	1,080		1,080

SUMMARY

Personnel costs	4,630	7,850	12,480
Transport costs	8,360	3,586	11,946
Stationery	—	1,080	1,080
TOTAL (kwachas)	12,990	12,516	25,506
5% contingency	650	626	1,275
GRAND TOTAL (kwachas)	13,640	13,142	26,781
(US$)	5,683	5,476	11,159

(Exchange rate 1 US$ = K 2.40)

Annex 17.2. International sources of funding for research

1. International multilateral agencies

WHO and associated special programs:

- WHO Regional Offices
- WHO Headquarters
- TDR (Tropical Disease Research)
- CDD (Control of Diarrheal Disease)
- HRP (Human Reproduction Programme)

UNICEF (United Nations Children's Fund)
World Bank
IARC (International Agency for Research on Cancer)

2. Bilateral agencies

USAID (United States Agency for International Development)
IDRC (International Development Research Centre)
SAREC (Swedish Agency for Research Cooperation with Developing Countries)
GTZ (Deutsche Gensellschaft Fur Technische Zusammenardeit)
JICA (Japanese International Cooperation Agency)
BOSTID (Board on Science and Technology for International Development)
CIDA (Canadian International Development Agency)
SIDA (Swedish International Development Agency)
ODA (Overseas Development Agency)
ADAB (The Australian Development Assistance Board)

3. Private foundations

Rockefeller Foundation
Carnegie Corporation
Ford Foundation (Child Health)
Kellogg Foundation (Health Services; primary interest in Latin America)

4. National sources

This will vary from country to country.

Addresses of some funding agencies

1. Rockefeller Foundation
   1133 Avenue of Americas
   New York, NY 10036
   U.S.A.

2. Carnegie Corporation of New York
   437 Madison Avenue
   New York, NY 10022
   U.S.A

3. Director, International Health Policy Program,
   S-6133, 1818 "H" Street, NW
   Washington, DC 20433
   U.S.A.

4. Health Sciences Division,
   International Development Research Centre
   P.O. Box 8500
   Ottawa, Canada K1G 3H9

5. The Asia-Pacific Academic Consortium for Public Health
   420/1 Rajvidhi Road, Pyathai,
   Bangkok 10400, Thailand.

6. Primary Health Care Operations Research,
   Center for Human Services,
   5530 Wisconsin Avenue
   Chevy Chase, MD 20815
   U.S.A.

Module 17: BUDGET

Timing and teaching methods:

3/4 hour	Introduction and discussion
2 1/2 hours	Group work
1 hour	Plenary
4 1/4 hours	TOTAL TIME

Introduction and discussion

- Introduce and discuss important issues related to project budgeting.
- Invite input from those participants who have experience in making budgets.
- Explain the concepts of UNIT COST (e.g., 50 cents/km) and MULTIPLYING FACTOR (e.g., 1500 km as the total mileage) and make sure that everyone understands them.
- Refer to the budget example (Annex 17.1).
- Emphasize the importance of a budget justification.
- Discuss useful strategies for reducing a budget that is too high.
- Before sending participants into their respective groups it is important to announce STANDARD unit costs both for transport (mileage or fuel) and for allowances. These should conform with ministry of health regulations. If there are limits to budgets, these should be agreed upon beforehand as well.

Group work

Ask the participants to meet in their groups and prepare the budget for their own project, based on the work plan (Module 15). Ask them to specify what the contribution of their own institution or ministry will be to the project and what the external donor is requested to contribute.

Plenary

Ask each group to present its budget proposal in plenary. Allow sufficient time for discussion after each presentation.

Health Systems Research Training Package
Volume 2, Part I: Proposal Development and Fieldwork

Module 18:

FINALIZING AND REVIEWING THE RESEARCH PROPOSAL

Steps in the development of an HSR proposal

Questions you must ask	Steps you will take	Important elements of each step
What is the problem and why should it be studied?	Selection, analysis, and statement of the research problem	- problem identification - prioritizing problem - analysis - justification
What information is already available?	Literature review	- literature and other available information
Why do we want to carry out the research? What do we hope to achieve?	Formulation of objectives	- general and specific objectives - hypotheses
What additional data do we need to meet our research objectives? How are we going to collect this information?	Research methodology	- variables - types of study - data-collection techniques - sampling - plan for data collection - plan for data processing and analysis - ethical considerations - pretest or pilot study
Who will do what, and when?	Work plan	- personnel - timetable
How will the project be administered? How will utilization of results be ensured?	Plan for project administration and utilization of results	- administration - monitoring - identification of potential users
What resources do we need to carry out the study? What resources do we have?	Budget	- material support and equipment - money
How will we present our proposal to relevant authorities and potential funding agencies?	Proposal summary	

N.B. Development of a research proposal is often a cyclical process. The arrows indicate that the process is not always linear.

Module 18: FINALIZING AND REVIEWING THE RESEARCH PROPOSAL

OBJECTIVES

By the end of this session, you should be able to:

1. **Finalize the research proposal** for presentation to the relevant authorities
2. **Write a brief summary** of the completed research proposal

I. Finalizing the research proposal

II. Writing a summary of the research proposal

III. Presenting the research proposal to the relevant authorities

I. FINALIZING THE RESEARCH PROPOSAL

When you have finished the methodological section of your research proposal and have pretested the methodology or at least reviewed it thoroughly (Module 14), you can start preparing the final draft of various parts of your research proposal.

You can, therefore, start working on part I of Module 18 any time after the group work of module 14 has been completed.

The outline of your research proposal as presented in Module 1 is as follows:

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Background information
1.2 Statement of the problem
1.3 Literature review

2. OBJECTIVES

3. METHODOLOGY

3.1 Study type, variables, data-collection techniques
3.2 Sample
3.3 Plan for data collection
3.4 Plan for data processing and analysis
3.5 Ethical considerations
3.6 Pretest

4. PROJECT MANAGEMENT

4.1 Staffing and work plan
4.2 Administration and monitoring
4.3 Plan for utilization and dissemination of results

5. BUDGET

5.1 Budget
5.2 Budget justification

ANNEXES

Annex 1. References
Annex 2. List of abbreviations (if applicable)
Annex 3. Questionnaires (and/or other data collection tools)

How should you proceed?

1. The first section of your proposal contains **background information, the statement of the problem**, and **literature review**. This section should convince the reader of the relevance of the study (magnitude, severity of the problem). It should provide enough background data for an outsider to understand the factors influencing the problem and the setting in which it occurs. Your review of available literature and reports should further illustrate why the problem is important, not only in your own working area, but probably also beyond.

   You can justify your study by pointing to the gaps in available information that you hope to fill with the data from your planned research. Finally, you can increase the interest of your readers by summarizing what results you hope will emerge from your study and how you plan to use them to help solve or alleviate the problem on which your study concentrates.

   You, therefore, have to thoroughly review the various pieces of text that you have produced during earlier sessions of the workshop, and rewrite them to form a coherent proposal.

Note:

When developing your research methodology you may have somewhat revised your focus on the research problem; you may have become more specific, added certain factors or omitted others. These changes should be made on the text of your proposal because all parts of the study should be consistent and logically connected to each other.

When revising your proposal you are working backward. Rereading the directions for the group work in Module 4 might be helpful.

2. The second section of your proposal focuses on the **research objectives**. Critically review these objectives. Determine whether all changes made during the development of your variables and data-collection tools have been added.

3. The next section presents the **methodology**. You have already prepared small sections focusing on various aspects of your methodology. You should check the text for clarity of wording (an outsider must be able to understand what you mean) and logical coherence.

4. Discussion of various **ethical issues** affecting your study may be scattered in different parts of your draft. Identify the most important issues and discuss them in a separate section. (Include, for example, issues relative to the selection of your topic, your methodology, and the collection of your data.)

5. The last sections of the research proposal, which will focus on **project management**, the **dissemination of results**, and the **budget**, are quite clear cut. When writing them, it may be useful to refer to the directions presented in the group work sections of the respective modules.

6. **Annexes**. Your list of references can be Annex 1. You might like to add a list of abbreviations, if there are many. In addition, your data-collection tools should be annexed, each with a number, so that you can easily refer in the text to the various instruments.

GROUP WORK

1. Prepare a final draft of your proposal following the guidelines presented above. It is advisable to work in groups of one or two persons, each with the responsibility for one or more sections.

   Take care that you number the sections, for example as in the outline presented in this module.

2. Two persons should be responsible for final editing. They should review and revise the text so that it flows smoothly from one section to the next.

3. All members of the group, including the facilitator, should have read all sections of the proposal before the final manuscript is handed in for typing.

4. The principal investigator should be responsible for coordinating the production of the final draft of the proposal.

   It is useful to prepare a list of all sections that have to be written (see table of contents) and make a note as they go through each step in the production process.

For example:

	Gone first typing	Back from typing	Revised	Gone final typing
1. INTRODUCTION 1.1 Background information				
1.2 Statement of the problem				
1.3 Literature review				
etc.				

II. WRITING A SUMMARY OF THE RESEARCH PROPOSAL

When you have completed writing your research proposal, there is usually a need for the protocol to be reviewed by senior authorities and policymakers or funding agencies. For the purpose of obtaining approval from policymakers or very busy administrators, it is advisable to add a summary (of no more than two pages) to the proposal.

A summary usually includes:

One page containing essential information such as:

- **Title** of the research proposal

- **Duration** (dates of onset and completion of the project)

- **Total budget** (in local currency and US$)
  - Contribution of ministry of health
  - Contribution of donor

- **Research team** (names and functions)
  - Principal investigator
  - Coinvestigators

- **Name of principal administrator**

A brief **narrative summary of one page**, which could contain the following elements:

- One paragraph on the **statement of the problem**
- **General objective**
- **Sampling** and **data-collection techniques** used
- Indications concerning **what major results may be expected** from the study

You should **put the summary at the beginning of the proposal**, although it is the last thing you prepare.

After the summary, a **table of contents** should follow. Adding numbers to the pages of your report and including them in your table of contents is one of the last activities involved in preparing your proposal.

Then a **title page** should be prepared, containing the title of your study, the names of the researchers with their titles, the name of the institution that has organized the course (ministry of health, or health research unit of the ministry of health, for example), and date of issue.

Note:

Add to the title page that this is a **research proposal**, to avoid confusion with your research report which most likely will bear the same title.

III. PRESENTING THE RESEARCH PROPOSAL TO THE RELEVANT AUTHORITIES

Before a research project can be implemented, the HSR proposal usually has to be:

- approved by the relevant health authorities,
- approved by the appropriate research committee or council, and
- given the funding.

In certain circumstances some of the above steps may be combined.

The procedure for approval may require that the research proposal be submitted with an accompanying letter or prescribed forms to the relevant authority. In addition, the researcher may be requested to make a brief verbal presentation or "defend" the proposal in person.

During the workshop, participants can make 7-10 minute presentations of their research proposals to a panel, so they can gain an appreciation of the concerns of the various approving agencies and to acquire the skills to respond briefly and succinctly to questions relating to particular aspects of the proposal.

Presentation to a panel

The panel should consist of experiences researchers (who will comment on the research aspects of the proposal) and health managers who are familiar with the problem that is being investigated and will, therefore, be competent to comment on the focus, scope, and usefulness of the proposed study. The panel members should be given a copy of the research proposal before the presentation begins.

Each participant group should prepare a presentation covering briefly the salient points in each section of their proposal. Participants should be encouraged to use the overhead projector and to practice and time their presentation prior to the actual presentation to the panel. (See Trainer's Notes on course management during the workshop for further details on presentation skills that should be stressed.)

The main points that should be emphasized in the presentation include:

1. Title of the study
2. A brief description of the problem, why the study in needed, what information is needed, and how such information will be used
3. Objectives of the study
4. A summary of the variables
5. A brief statement on the type of study design, sample, and methods of data collection
6. A summary of how the study will be implemented (where, by whom, when, etc.)
7. A summary of how data will be analyzed to provide the required information
8. A summary of the main resources required (e.g., manpower, budget, transport)
9. A brief summary of ethical considerations and plan for dissemination of results.

Although the presentation itself should be brief, participants should be prepared to respond to detailed questions on any of the aspects of the proposal that have been presented.

Submission of the proposal

Accompanying letters should contain the title, the name of the principal investigator and principal administrator, and the period over which you hope to carry out the study. If a letter is going to the national research council or a similar group you may briefly refer to your study's methodology and expected results and mention where further details can be found in your proposal. In letters to potential donors, you should state the total amount required and the account to which the money, if granted, should be transmitted.

Module 18: FINALIZING THE RESEARCH PROPOSAL

Timing and training methods:

1/2 hour	Introduction and discussion
8 hours⁺	Group work

Introduction and discussion

- Part I of this module should be presented as soon as one or more of the groups is ready to start compiling their final document. Parts II and III may be presented in the same session or somewhat later in a separate session. The presentation of the proposal to the panel of relevant authorities, which will come near or at the end of the course, should be arranged early so that key authorities will not have scheduling conflicts.

- Stress, with the participants, the importance of preparing the final draft of their research proposal in such a way that it reads well to outsiders not fully familiar with their topic. It should be comprehensive, to the point, and coherent.

- A brief summary is required for decision-makers who have little time to study the whole research proposal. It is best to write this summary when the proposal is more or less finalized. The team should pay extra attention to writing the summary, as it is the eye catcher for their proposal.

To ensure that the research proposals are prepared, typed, and duplicated in time for the panel presentation, facilitators should monitor each group closely, making sure that the sections of the proposal that have been completed are promptly submitted to the secretariat for typing. Encourage groups to use the list of proposal sections presented in the group work as a checklist to keep production of the final draft coordinated.

Group work

The major task of the facilitator is to assist the principal investigator in distributing writing tasks among group members, in editing, in organizing the typing, and making corrections in the typed versions. All group members should be involved in writing, either working in pairs or individually. They should read all sections written by others. The summary, in particular, should be discussed by the group as a whole.

If time allows, it is highly recommended that a draft of the proposal (or of the most important sections of the proposal) be given to a facilitator of one of the other groups for comments before it goes for final typing.

Presentation of the research proposal to a panel

Trainers should use the presentations to the panel as an opportunity to establish interaction between participants, health managers, and experienced researchers. This interaction will be beneficial to all parties. For example:

- The **participants** will acquire a better understanding of the concerns of managers and of research councils. Also, they will acquire confidence in presenting and defending research proposals.
- The **managers** who will be exposed to a systematic approach to problem solving and acquire a better appreciation of research information.
- **Experienced researchers** will be exposed to the concerns of HSR and acquire a better understanding of the approaches and potentials.

Briefing of panel members

The course facilitator should brief panel members so that they understand the purpose of the presentation. It is useful to request that they behave as though they were members of a research committee that is responsible for approving the projects.

Time allocated

Allow 7-10 minutes for each presentation and 10 minutes for questions and discussion.

Role of facilitators

During the presentation, course facilitators should, as far as possible, refrain from intervening unless it is obvious that an important point is being misunderstood or overlooked. However, panel members or participants may require assistance on specific issues, and the facilitators should serve as resource persons for this purpose.

Health Systems Research Training Series
Volume 2, Part I: Proposal Development and Fieldwork

Module 19:

FIELDWORK ACTIVITIES

Steps in the fieldwork phase

Questions you must ask	Steps you will take	Important elements of each step
Will managers and health staff provide support?	Administrative and motivational preparation	- briefing: obtain permission - form research groups
Are formats and instruction manuals ready? Have data collectors been trained?	Preparation for data collection	- logistic preparations - pretesting and revision of tools - training - arrangements for supervision and quality control
Is data collection on schedule?	Data collection	- checking; sorting
For qualitative data, are more (or different) data needed?	Data processing and preliminary analysis	- coding and preparation of manual for data processing by computer OR - preparation of master sheets for manual processing of data - categorization of qualitative data

Module 19: FIELDWORK ACTIVITIES

PROCEDURAL GUIDE
for course participants, so that during the field period they will have:

1. Briefed managers and health-service staff regarding the project.
2. Obtained the necessary permission to collect data.
3. Identified and obtained the resources (manpower, materials, etc.) needed to collect data.
4. Reviewed the availability of subjects and information and organized logistics for data collection.
5. Trained interviewers/data collectors/supervisors.
6. Refined, pretested, and revised the research instruments and procedures for data collection.
7. Collected the required data.
8. Processed the data.

The activities to be carried out between the workshop on proposal development and the workshop on data analysis and report writing consist of field operations and data processing. The resource person for the project should visit the research team at least once, but preferably twice, including:

- during the training of research assistants (if required) and pretest, and
- at the onset of data processing.

He or she should also be available for consultation by telephone.

The activities that should be completed during the interworkshop period are discussed below:

1. Briefing of managers and health service personnel

The **purpose** of the briefing is to obtain support for the project. Such support is necessary to obtain resources as well as to obtain permission to collect data. Attention to the following points will increase your chances of obtaining permission to conduct the study and being allocated adequate resources:

- **Selecting the relevant audience(s) for the briefings**

  It may be necessary to obtain resources and permission for the study at several levels and from different organizations. Briefings should be conducted with:

- your direct superiors;
- managers or key persons in the institutions, organization, and communities that are being studied; and
- other key persons or organizations that will be involved in the research or utilize the results.

Note that "key persons" should include the official authorities as well as the unofficial opinion leaders. **For example**, in a hospital, the nursing sisters in charge of wards are important opinion leaders although they may not be designated as hospital managers.

Because of the differing interests of these audiences, it may be advantageous to brief them separately, using a different emphasis in each presentation.

- **Winning support**

Present the project as an institutional project with yourself as the advisor or leader of the project. Do NOT present it as a project you have to do as a training or research exercise. The briefing should enable the audience to recognize the benefits the project will bring to their own unit or services. This will encourage them to "adopt" the project and provide support.

Develop strategies to overcome resistance and generate support. For example, identify a high-level officer who is likely to be supportive and invite him to the briefing. Evidence of his interest will influence others who are lukewarm.

2. Identifying and obtaining project resources

Identify and obtain the resources (manpower, materials, etc.) needed to collect data. Refer back to your project document to make sure that all the items needed for the study are included.

- **Requesting assistance**

Identify specific types of assistance that will be needed and present these requests diplomatically during the briefings. For example, "Do you think health-centre staff could help fill in two questionnaires per day over a period of 6 weeks?" is more likely to receive a positive response than "I need manpower" or "I need nurses for this study."

3. Reviewing availability of subjects and information[1]

It is important to make a personal visit to every site where data will be collected to understand the physical and manpower limitations, constraints and special circumstances that could influence data collection. During the visit:

- **discuss** with the staff and community members who are on site any routine procedures and patterns of behaviour (e.g., working hours) that may affect availability of subjects.

- **observe the physical conditions and procedures** that are being followed to determine how they will affect your proposed data-collection procedures. Remember that data collection will be reliable only if it does not overburden busy staff members or disrupt routine procedures. If the researchers familiarize themselves with the actual situation at the site, it is often possible to design data-collection procedures that do not interfere with on-going activities.

- try to use **local personnel** for data collection, as they are more aware of local customs and problems. They may be less expensive, require less training, and less disruptive. Outside personnel should be used only if local staff are truly too busy or if it is likely that results will be biased if local personnel are used.

- if sources of data include registers, cards, etc., **inspect a sample of the data sources** so that you are able to modify data-collection tools to enable the data collector to access the information with a minimum waste of time.

- **identify suitable members of staff** who can be data collectors and additional supervisors, if the research team itself will not be able to do all the supervision. If data collection has to be done after office hours, remember to devise a system of supervision for those hours as well.

4. Organizing logistics for data collection

Having made an inventory of available resources, the logistics for data collection have to be organized. This will involve planning in detail how, where, and when data collection will be carried out.

5. Preparing fieldwork manuals

Manuals or instruction sheets should be prepared for:

- **Interviewers**

  The manual for interviewers should have instructions concerning the:

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[1] Sections 3-9 are based on: Population Council, 1970. A manual for surveys of fertility and family planning: knowledge, attitude and practice. New York, NY; and Institute Kesihatan Umum, 1986. National health and morbidity survey, supervisors' manual. Kuala Lumpur, Malaysia. (monograph document).

- purpose of the study,
- role of the interviewers,
- the way interviewers should introduce themselves to respondents,
- interviewing techniques,
- questionnaire:
    - * General format
    - * Clarification of terms and what the research units are (e.g., household, family, respondent)
    - * Instructions regarding how to ask complicated questions (e.g., whether to mention precategorized answers or not and whether to probe for more than one answer or not)
    - * Instructions concerning how to fill in answers (e.g., the need to write answers to open-ended questions using the words of the informants)

- Use of the map (if any),
- Sampling procedures (and what to do if informant is absent, etc.).

- **Other data collectors**

The manual for other data collectors should have instructions concerning the:

- general purpose and plan of the study,
- role of the data collector,
- use of data collection tools, for example:
    - * Instructions for properly calibrating measuring instruments
    - * Instructions regarding measurement
    - * Clarification of measurement units e.g. lbs, kg, metres, yards, etc.

- **Supervisors**

In addition to all instructions given above, the manual for supervisors should include information on:

- maintaining a record of interviewers' attendance,
- safe-keeping of data and records,
- determining the number of interviews to be completed each day by interviewers,
- ensuring the quality control of field work,
- dealing with non-responses and incomplete interviews,
- reporting progress to the coordinator at specific intervals.

6. Training interviewers/data collectors/supervisors

Data collectors must be given explicit training. They should not only be able to collect data properly, but also understand other procedures such as the selection of sampling units, map reading and data handling. They may also be involved in the pretest and adjustment of instruction sheets and data-collection tools after the pretest.

The training program usually consists of:

- reading manuals or instruction sheets prepared for the study,
- classroom instruction,
- experience in the field (this may include participation in the pretest described below),
- discussion of data-collection tools and instruction sheets and how they need to be adjusted (based on field-testing).

The data collectors and the supervisors should be trained together.

7. Conducting pretest in the research location and revising data-collection tools

- The pretest should assess the validity of the data-collection instruments and procedures, as well as the sampling procedures.

- Reread **Module 14** before planning your pretest.

- Arrange for your **resource person** to **visit during the training of interviewers and pretest.**

- The study may involve the use of a variety of methods of data collection such as:

  - collection of data from recorded sources,
  - face-to-face interviews using questionnaires,
  - focus group discussions, and
  - measurements or observations.

  Plan to pretest all your methods.

- **Analyze the data you collect during the pretest**. Finalize and fill in master sheets. Fill in some of the cross-tables. This process will help you make a realistic assessment of the entire data-collection and analysis process and will invariably lead to revisions of some of the tools.

- **The pretest should identify scientific as well as logistical problems and constraints**. Discuss these with your resource person.

- **Revise the data-collection and data-analysis tools and procedures** after the pretest. Arrange for typing and copying or duplicating of the tools. Check all forms for accuracy before duplicating. (See Module 10B.) Make sure that sufficient materials and manpower are available for this process. If a computer will be used for analysis, prepare a coding manual.

8. Collecting data

Having obtained permission for the study, and having

- obtained the necessary resources,
- trained the required personnel,

- organized the logistics, and
- pretested and modified the data-collection tools and procedures,

the data collection can be carried out.

9. Processing data

After collecting and sorting the data, all questionnaires and records should be checked for errors. The content may be converted into quantifiable numerical form for processing by computer or other means.

The steps during this process include:

1. editing/cleaning,
2. categorizing and coding,
3. summarizing data on master sheets, or
4. if a computer is used, writing instructions to the computer analyst concerning data input and analysis.

Note:

Reread **Module 13** for more information on steps in data processing and analysis.

Editing

During editing, look for:

- Completeness of responses. (Note that a blank space may mean "no response" or "don't know" unless you've made a category for each of these responses.)
- Logical inconsistencies, correcting them whenever possible.
- The possibility of combining responses, if that is more suitable for analysis (making scores, see **Module 13**).

Editing should be done by the research team or under its direction. If several persons are involved in editing, as in the case of large surveys, an **editing manual** should be compiled beforehand.

Categorizing and coding

A coding manual (required if data will be analyzed by computer) should have been completed when the questionnaire was finalized after the pretest. Look at **Module 13** for coding instructions and for instructions on how to process data from open-ended questions.

Summarizing data on master sheets

After the data have been edited and coded, they may be summarized on master sheets.

- Review your master sheets. Have your questionnaires changed since you developed your master sheets? Can you categorize the answers to questions that you were unable to categorize before?

- Remember that for manual analysis, you can use letters to represent the different categories of your variables (e.g., M for male, F for female).

- Fill in your data on the master sheets. Do not forget to include information on missing data and nonresponses.

- Prepare frequency counts for the variables tabulated in your master sheet and check that they match the number of respondents in your sample.

Computer analysis

If the study is large, or if there are other reasons for the use of a computer, instructions should be written for the computer analyst.

After editing, coding, and summarizing data, a preliminary analysis can be made by hand or using the computer. (See **Module 20**.)

Final note:

Despite all the advice presented in this module, emergencies may arise during the fieldwork. WHAT SHOULD YOU DO??

1. **Use common sense**
2. **Consult your principal investigator and co-researchers**
3. **Consult your research proposal**
4. **Consult the modules**
5. **Write/phone/telex/fax your facilitator**
6. **Others (specify) ....**

Module 19: FIELDWORK ACTIVITIES

Timing and teaching methods

10-15 minutes	Presentation and discussion

Presentation and discussion

This module has been prepared to provide course participants with a succinct guide that covers all the tasks they must complete during the fieldwork period. The module need not to be presented, but participants should be made aware of its content so that they will remember to consult it during appropriate stages in their fieldwork.

Role of resource persons during the fieldwork

Research teams should receive at least one, and preferably two, visits from a resource person during the fieldwork period. If only one visit is possible, this visit should focus on:

1. Checking the progress of the project;

2. If necessary, assisting in obtaining managerial support;

3. Observing the real-life situation in which the project will be implemented, identifying problems and anticipating pitfalls;

4. Evaluating the proposed methodology for data collection with the group (by discussing as well as by pretesting in the field) and advising of any necessary modifications in the research design (sampling, data-collection tools);

5. Assisting in the training of research assistants (if required); and

6. Finalizing and trying out the procedures for data processing and analysis during the pretest and, if a second visit is possible, assisting at the onset of data processing and analysis.

Suggested checklist

1. Determine whether managers and health staff concerned have been adequately briefed.

2. Determine whether permission for data collection has been obtained. (The resource person can provide support by making courtesy calls.)

3. Review each of the proposed methods of data collection, reassessing:

   - Sampling size, sampling frame, and sampling techniques
   - The data collection tools that have been developed. Make sure that the tools collect the necessary data for each variable, while not collecting any unnecessary information.

4. Make sure that the research team has visited data-collection sites and identified constraints, existing procedures, possible resources.

5. Determine whether the pretest of data collection has been well planned. (Assist, if necessary.)

6. Assist with the pretest and training of research assistants and advise on

   - revision of data collection tools,
   - preparation and adjustment of the fieldwork manual,
   - supervision of data collection,
   - editing and coding of the data collected, and
   - processing of data (data master sheets).

   N.B. The sequence of these activities is arbitrary. Revision of instruments may occur twice, before and after pretesting. Fieldwork manuals may be prepared before the pretest, but adjusted thereafter.

7. Make arrangements for telephone or written consultation during subsequent stages of the fieldwork, encouraging the participants to contact you when necessary.

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Module 20:

PREPARING A PRELIMINARY REPORT

MODULE 20: PREPARING A PRELIMINARY REPORT

OBJECTIVES

After reading this module, you should be able to:

1. **Summarize** your field experiences and observations, including technical or logistical difficulties encountered in carrying out your research project.
2. **Assess** the extent to which you are able to answer the specific objectives with the data you have collected.
3. **Summarize** your main findings and preliminary conclusions for each objective.
4. **Identify** areas in which you need to do further analyses and specify in what sets of data you will find the data.
5. **Produce** a preliminary report which covers all the issues mentioned above.

Why should you prepare a report that summarizes your fieldwork experiences, observations, and preliminary conclusions?

This will help you to:

- **get a clear overview** of the data collected (both qualitative and quantitative), your field observations and impressions, and consider how different sets of data work together to answer the research questions implied in your objectives;

- **assess** how well your research project was designed and thus the extent to which you can provide valid information to help solve the problem you investigated;

- **develop** the general approach you will use in reporting your findings and drawing conclusions;

- **allow the facilitators** and the other groups to provide you with feedback that will help you identify what further analyses to make and how to organize the final report; and

- **assess** what you have gained from the data analysis workshop by comparing your preliminary and your final report.

What information should be included in the preliminary report?

- A review of your fieldwork experience, and
- A summary of preliminary findings.

1. Fieldwork experience

Review your fieldwork experience and evaluate how well you were prepared technically (in terms of the methodology developed in your research proposal) and organizationally (work plan, budget, and administrative procedures). Summarize your experience and your evaluation of it in at most two pages. Address questions such as those posed below:

- **General**
    - How did you function as a group? Were all group members active?
    - Did you lose any members? Did you recruit any new members?
    - What procedures did you follow to obtain permission for the research?
    - Did you manage to obtain the research assistants, equipment, transport, and financial support needed?
    - Were the resources you budgeted sufficient?

- **Technical preparations**
    - What did you do to train your research assistants? Where and how did you do your pretest or pilot study? How long did it take? Were any major revisions of the data-collection tools and research procedures necessary?

- **Fieldwork**
    - Did you do your sampling the way you had originally planned? Did you obtain the information and cooperation you wanted? How does your planned sample size compare with the actual sample collected? How many interviews did you conduct? (N.B. If you have different categories of informants, **specify for each group**.) How many records were analyzed?
    - Were your data-collection tools adequate? Did they provide you with the information you wanted?
    - Were you able to follow your work plan? Did you correctly estimate the manpower and time needed to collect the data?

- **Technical support**

  Did you receive support from your facilitator/resource person? In what phases of the fieldwork? Was the support timely? Was it sufficient or would more support have been helpful?

2. Research findings

When presenting research findings:

- First of all, **get an overview of all the data you collected.**
    - Review any record forms or checklists you've completed. Has all the data you wanted to obtain been collected?
    - Review your master sheets or any computer outprints available. Are they complete?
    - List the answers to open-ended questions.

- **Write down results** from:
    - Focus group discussions (if conducted),
    - Interviews with key informants, and
    - Field observations.

- **Reread the plan for data analysis** in your research proposal. Review the preliminary analysis of data you conducted during the pretest in the field. You may have done some useful ground work for data analysis that can be used now as you prepare your preliminary findings.

- **Reread your statement of the problem and the objectives.**

  Take the SPECIFIC OBJECTIVES as a starting point. Brainstorm as a group on the data you have collected and to what extent they appear to answer the research questions implied in your objectives.

  Consider not only the quantative data from record forms and relevant sections of your questionnaires, but also qualitative data and relevant observations you made or impressions you gained during the fieldwork.

Discuss whether (and how) the data from various sources complement or contradict each other.

Record the details of these discussions. This will help you structure the report you are going to write, keeping focused on major issues, but not forgetting relevant information.

- **Analyze** the dependent VARIABLES that further describe the nature, size, and distribution of your problem and make a brief summary.
- **Prepare** (at least) two tables for each objective, showing how crucial independent variables relate to dependent variables. (Review the dummy tables you prepared when developing your research proposal and determine which of them you can use.)

  If you have mainly untabulated, qualitative data, just summarize how crucial parts of the data you collected will answer the questions implied in your specific objectives.

If you have gone further with preliminary data processing and analysis, state what you have done and what remains to be done.

GROUP WORK

1. **Select a team member** to be responsible for taking notes on your discussions and **divide responsibilities** for writing specific parts of the preliminary report.

2. **Complete the review of your fieldwork experiences** as proposed in section 1 of this module, stressing the problems you experienced and whether and how they were overcome. This review should be very brief, at most two pages. Include a summary description of your sample population (persons and/or records).

3. **Discuss your specific objectives one by one,** brainstorming on whether you have data to answer the research questions implied in your objectives. Remember to consider not only data obtained from record reviews or interviews, but also from informal interviews with key informants and your own observations during fieldwork.

4. **State tentative conclusions you can draw from your research at this stage,** using all data available.

5. Give a brief **overview of how far you have proceeded with data analysis** and what remains to be done:

   - **Processing of material:**

     - Have master sheets been filled in (or if a computer is used, has data entry been completed)?
     - Have all qualitative data been listed and categorized?

   - **Preliminary analysis:**

     - Have all straight frequency counts been done?
     - To what extent have cross-tabulations been made?
     - Has the interpretation of qualitative data been completed?

The preliminary report should not exceed four or five pages. Try to have it typed or clearly written. It can be distributed at the beginning of the data-analysis workshop. The main points from the report can be put on overhead sheets on the first workshop day for presentation in plenary.

Trainer's Notes

Module 20: PREPARING A PRELIMINARY REPORT

Timing and teaching methods

10 minutes Introduction and discussion

It is not necessary to present this module during the workshop, but the participants should be made aware of its content. Facilitators should stress that participants should consult the module when they have filled in their master sheets or have received the first outprints from the computer. It will guide them in beginning data analysis and preparing the preliminary report that the principal investigator will present on the first day of the data-analysis workshop.

If a facilitator can pay two visits to the field, the second visit should preferably take place at the onset of data processing. He or she can then work with the group on this task, using **Modules 20** and **13** as reference material.

Note:

The discussion of Modules 19 and 20 can easily be combined. The best opportunity to discuss them may be just before the course evaluation, when groups have handed in the final draft of their research proposal for typing.

ANNEX: GUIDELINES FOR ORGANIZING SHORT HSR COURSES ON PROPOSAL DEVELOPMENT AND FIELDWORK[1]

I. Planning for the workshop

II. Management during the workshop

III. Training methodology

IV. Implementation of projects (the fieldwork period)

V. Examples of course budget, course schedule and handouts for participants

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[1] The materials in this section are adapted from WHO (1988) and PHI (1988).

I. PLANNING FOR THE WORKSHOP

Selection of trainers and facilitators

The course coordinator will be the chief organizer of the course. A course coordinator will usually be supported by four or five facilitators. This team will be responsible for planning the course content, preparing instructional objectives, and guiding the learning process throughout the course. They will give lectures, facilitate group sessions, and guide research projects.

Course facilitators may be selected according to the following criteria:

- Experience in health systems research (HSR);
- Experience with participatory teaching;
- Availability for the duration of the workshop and for field visits to provide supervision and support during the 4-6 months when research projects will be implemented;
- Experience, if possible, in previous HSR workshops as a participant or facilitator;
- Ideally, the team should comprise a variety of disciplines, such as medical sociology, health management/public health, and epidemiology; and
- An equitable mix of male and female facilitators is recommended.

Course manager

Although the course coordinator is responsible for the overall functioning of the course, it is highly recommended that he or she delegate administrative tasks to a course manager. The course manager will, for example, make administrative arrangements, supervise support staff (typists, drivers), ensure that participants and facilitators receive the necessary support to travel to and from the course site, and make sure that necessary payments are made and various other support tasks during and after the workshop are carried out promptly. The course manager should attend all meetings of facilitators so that logistic support for the participants can be arranged for appropriate times.

Proposal for conducting the workshop

To obtain approval and funding to conduct a workshop, a proposal should be submitted to the relevant authorities about 18-24 months before the workshop. The proposal should include:

1. The title, a brief background statement, and summary of the rationale for the workshop;
2. Objectives of the workshop;
3. Number and types of participants;
4. Tentative date, duration, and venue;
5. Budget requirements (see guidelines on budgeting in Part V);
6. Any assistance required in the form of consultancies from within and outside the country.

Requests for consultants (if needed)

Requests for consultants should be based on specific terms of reference and made through the ministry of health to the relevant donor agency. The workshop proposal should be included with the request.

Preworkshop preparatory activities

A workshop organizing committee consisting of the course manager, a core group of facilitators, and the course administrator should be set up at least 5 months before the workshop to:

1. Determine who the participants will be;
2. Identify content areas, methodology, and course schedule (see part V of this Annex for sample schedules);
3. Identify and arrange for the venue;
4. Identify and make plans for procuring the required materials (e.g., stationery, other supplies, and transport); and
5. Identify resource persons who may be required to give special technical input.

Selection of participants (about 4 months before the workshop)

Number of participants: 20-25

Criteria for selection:

The criteria for selection of the participants should be clearly defined, taking into consideration the types of participants who are available, their educational background, the feasibility of their incorporating research into their functions, and the development needs of the HSR program in the country. The following factors have been found to be useful in selecting participants for the basic course described in this volume:

- It is useful to select small groups of participants from the same geographic or institutional location, so that they can develop and implement a research proposal as a team and support each other in the development of subsequent research projects.

Note: It is important to have one trainer/facilitator per group.

- If HSR is in an early stage of development, give priority to the following participants:
  - Staff of appropriate training institutions (e.g., public health, nursing schools, etc.) so as to rapidly create a pool of persons who can both do research and help others;
  - Staff who have had previous exposure to basic epidemiological or sociological research;
  - Participants with leadership qualities;

  - Participants from districts, institutions, or regions where the director or manager is strongly committed to HSR and is likely to provide leadership and support;
  - It is advantageous to have participants from several disciplines. Therefore, select participants from the major health programs (i.e., maternal and child health, sanitation, nursing, rural development, and perhaps include some junior social scientists).

- In subsequent workshops a good mix of district or provincial-level participants may be invited.

Notifying participants selected for the workshop and their supervisors

Communications with national and regional or provincial authorities, or institutes that are invited to provide participants should be made 3-5 months before the workshop.

Informal contact should be made with these authorities to inform them of the training course, to enlist their interest and support in selecting problems for the research projects, and to appoint the most suitable participants. The criteria for selection of participants and topics should be described and the managers should be requested to explore potential topics with staff members who are selected as participants.

Official letters should be sent to the supervisors stating:

- The objectives of the training course;
- The structure and schedule (e.g., two workshops with a fieldwork period of 5-6 months (part-time) for implementation of an HSR project in between);
- The venue of the workshop;
- The selection criteria for participants;
- The preparations the participants need to complete before attending the workshop;
- The deadline for the confirming participation in the workshop; and
- A request that the supervisors identify specific topics for HSR projects that the participants can consider during their workshop (only for courses where selection of topics is completed prior to the course). A copy of Module 1 and the relevant sections of Module 3 could be sent to the supervisors (and participants) to guide them through the process of selecting appropriate topics.

Communication with selected participants

An information circular should be sent to all the participants selected, providing them with preliminary information on the workshop (similar to the one sent to their supervisors). It should emphasize that they will be expected to do a research project themselves. The relevant sections of Module 3 can also be sent, if it is felt this would be helpful in providing guidance for the selection of topics.

See the sample of an information circular in part V. Note: If part of Module 3 is enclosed, this should be noted in the circular.

On receiving confirmation of their participation, the prospective participants can be sent background reading materials on HSR.

Discussions on training methodology and training procedures

It is extremely important that the trainer/facilitator team as a whole takes time to discuss the course content and methodology. All trainers should be very familiar with the training materials. Consensus will have to be reached concerning who will introduce each module and the role of facilitators during group work and plenaries. The capabilities of each member of the team will have to be assessed in relation to the training requirements.

Selection of additional local resource persons

Additional local expertise in disciplines such as epidemiology, statistics, or other assistance, such as that of a librarian or a researcher who is presently involved in an interesting HSR project, may be required.

Outside resource persons should generally not be asked to present modules, unless they are very familiar with the course and its methodology. However, it is useful to invite them to one or more of the course sessions to familiarize them with the course; to introduce them to the participants as valuable resource persons (both during the course and afterwards); to make their expertise available during group work; and, finally, to enlist their support for the implementation of the proposals being developed.

Invitation of authorities to open or close the course

Usually, a high official from the ministry of health or, if appropriate, a representative from another agency supporting the course should be invited to open the course. This is a useful strategy for making high-level officials aware of HSR and motivating them to support it.

Usually, the official openings of courses take place on the first morning. It might be worthwhile, however, to officially open the course the evening of the day before the first full day of the workshop. This will save time. Alternatively, the opening may take place in the late afternoon of the first day or the morning of the second day, when participants present the final selection of their research topics.

Invitation of donors

If you are considering inviting donors to explain what types of research projects they now support and to provide details on research priorities and funding procedures, it is advisable to invite them all together to participate in a panel session one evening.

Invitation of panel members for the presentations of proposals and research results

Plenary sessions at the end of workshop part I and workshop part II are important components of the HSR training course. At the end of part I each group may present its research proposal (optional). At the end of part II each group should present its research report including findings, conclusions, and recommendations. Each of these sessions presents the opportunity for participants to gain experience in presenting research proposals or research papers. It also provides the opportunity to invite senior managers, researchers, academicians, etc., as panel members so that they gain a better understanding of health systems research. Selection of appropriate panel members is important. Care should be taken to ensure that there are representatives in the panel who can react to the managerial aspects of the topic of the research, as well as those who can comment on the technical or methodological aspects of the projects. It is highly recommended that the managers who will utilize the research findings be included.

Selection of support staff

Support staff for the first workshop should include two typists and one driver/messenger for the entire workshop period. For the last 3 days of the workshop, four full-time typists would be desirable. Typists may have to work overtime to finish questionnaires before the pretest and to finalize research proposals. For the data analysis workshop, one typist may be sufficient during the first week, but when the groups start writing their reports four typists should preferably be available.

Site preparation

Space required:

- Plenary space for 30-35 people plus two or three small meeting rooms;
- Office facilities for 2-4 typists and space for a photocopy or duplicating machine.

Materials required:

- Access to a vehicle for the whole workshop period. During the pretest, extra transport may be needed.
- See part V for details concerning the materials needed.

II. COURSE MANAGEMENT DURING THE WORKSHOP

Course coordinator

The course coordinator will have overall responsibility for the workshop. Some of the essential functions include:

- Conducting opening and closing sessions;
- Making general announcements (reading materials for the next day, work on weekends, deadlines for submission of materials for typing, etc.);

- Presenting the session on orientation to the course and doing a review of progress at the start of each day to enable participants to keep track of the workshop process;
- Introducing resource persons;
- Maintaining a chart of the progress of each group on submitting their drafts of the proposal and report for typing (which should be on display throughout the course); and
- Resolving specific problems that may arise.

Chairing plenary sessions

It maybe useful to change the person who chairs the sessions, depending on the subject being discussed. For instance, the person presenting the introduction and guiding the discussion that follows could be the chairperson of that session.

Allocating facilitators to working groups

When the participants have selected their research topics, a final decision will have to be made as to which facilitators, considering their interest and expertise, would best be in charge of particular groups. Facilitators will, in principle, stay with the same groups throughout the course to ensure continuity and the quality of the end product.

In addition, each facilitator may have overall responsibility for certain technical aspects of the research process in which he or she is specialized, and assist other groups in these areas as well. Also local resource people may assist on an ad hoc basis.

Facilitators' meetings

To monitor course progress and give an opportunity to the facilitators to discuss possible problems, it is desirable to have a daily meeting of facilitators. This meeting is best held in the evening and will usually last between half an hour and an hour. The course coordinator is responsible for convening this meeting. It is probably helpful to have a secretary for each meeting and make a record at least of the action points.

Approval of projects

The national agencies that will need to endorse the research proposals (the national research council, for example) will also have to be mobilized before as well as after the workshop to speed up procedures.

Workshop report

The official report of the workshop should be as brief as possible. After a one-page introduction (when, where, why, organizers, sponsors, type of participants in the course), a summary report of 2-4 pages could follow, describing the training process, starting with the topics chosen and ending with evaluation of results. A list of participants and course facilitators and their addresses (possibly organized according to research group) could be annexed to the report, as well as (summaries of) opening speeches.

The report should contain the final drafts of the groups research proposals. It is highly recommended that the course facilitators as a group screen the proposals a final time immediately after the workshop, because some items may have been dropped out or added to the proposals that need some clarification. The final polishing up of the proposals can be completed in the month following the workshop. Usually procedures to obtain consent for implementing the proposals take up the first month so there is some spare time.

Meeting the participants' needs for technical support during research implementation

The facilitators who have assisted in the development of the proposals should also assist the groups in the implementation of the proposals. However, sometimes additional support may be required, (e.g., the assistance of an experienced sociologist or statistician for data collection and data processing).

The participants will need to state any needs they may have for additional support in their proposals and include related costs in the projects' budgets.

All groups will need assistance when they start sorting and processing their research data.

III. TRAINING METHODOLOGY

Sessions in this training course on health systems research contain the following components:

- Introduction and discussion,
- Group work,
- Exercises, and
- Plenary.

Introduction and discussion

The introduction and discussion period is used to explain briefly new concepts and their application. Inviting responses and suggestions from participants and listing these on a flip chart or using them as a starting point for discussion is an essential element of the training method. This increases the interest of participants and may bring up valuable points of view that would be missed in classical (pure lecture-type) classroom teaching. Do not allow the discussion to be dominated by a few participants.

Depending on the level of the participants, the facilitator can delete or add details in the introduction.

The text of the sessions as given in the training modules is not meant to be followed word for word. Each introduction and discussion period should not last longer than 30 or, at the most, 45 minutes.

Group work

The purpose of the group work is to develop four to five research proposals (one per working group) that should be **ready for implementation** by the end of Part I of the training course. Thus the facilitators need to always keep in mind that the proposals being developed need to be feasible and of good quality.

To increase the efficiency of the groups, a chairperson and reporter should be appointed for each group. The chairperson is not only responsible for leading the discussion, but also for dividing the work among group members. It is recommended that after discussion within the work group, the group should split up into groups of two or three persons to work on separate parts of the task to be completed. The work of each subgroup can then be discussed and amended before presentation in plenary.

Each facilitator should be responsible for one group throughout the course to ensure continuity. Facilitators should change groups only if they have major problems in assisting their own group. Other facilitators and resource persons, of course, can be consulted at any time on technical issues. The amount of time the facilitator spends with his or her group will depend on the needs and demands of that group. At the beginning of the course, the needs may be greater than toward the end. In principle, **facilitation is a full-time activity**. Even if a facilitator is not participating in the group work, he or she should be available at all times for consultation.

The facilitator's role in discussion is primarily to stimulate the group to find its own solutions. However, if the group is clearly going in the wrong direction he or she should provide more direct guidance. At first, the facilitator may have to keep the group from wasting time on less relevant issues, or prevent relevant issues brought up by group members from being dropped because not everyone sees their importance.

Exercises

There are two types of exercises. In some exercises groups practise the use of new concepts in case studies prepared in advance. For these, it is probably a good idea to organize groups of a different composition than for the group work, so that all participants get to know each other well. In the second type of exercise, each group will examine a component of the proposal that is being developed by another group and provide constructive criticism. Groups should be encouraged to put the summaries of their comments on flip charts or transparencies for presentation in plenary and for reference by the group developing the proposal. Not all modules contain exercises. Exercises can be omitted or added, depending on the needs of the participants and the time available.

Plenary

Presentations of the results of group work or exercises in plenary require special skills. Before the first plenary (in which the research topics considered for the development of research proposals are presented), the importance of presenting clearly and audibly and using readable visual aids should be discussed with the participants. The working groups can use either flip charts or transparencies for the presentations. Flip charts have the advantage that they can be easily referred to or elaborated on later in the working groups. However, if the plenary exceeds 25 persons, it may become difficult for all to read the flip charts. The use of transparencies and an overhead projector, in that case, may be indicated.

It should be stressed that there are limitations to what one can put on a transparency or a flip chart. Prepare two examples, one of a readable and one of an unreadable transparency, and let the participants give suggestions concerning how much information a transparency should contain.

Emphasize also that one should never turn one's back to the audience when presenting. (A pointer can be used to indicate various points on the transparency, rather than on the screen.)

In general, the presentation of one working group should not exceed 15 minutes, discussion included. Sometimes even less time is required. If necessary, the facilitator chairing the session should let presenters know when they have just a minute or so left.

IV. SUPERVISION OF RESEARCH PROJECTS: FIELDWORK ACTIVITIES

Activities during the interworkshop period consist of fieldwork and the preparation of data for processing. The facilitator or resource person for the project should visit at least once and be available for consultation by telephone.

Activities that should be carried out by participants

During this period, the participants should:

1. Brief managers and health service staff regarding the project;
2. Obtain the necessary permission to collect data;
3. Identify and obtain the resources (staff, materials, etc.) needed to collect data;
4. Review the availability of subjects or respondents, information, and resources and revise the methodology and ethical aspects of their projects;
5. Refine, pretest, and revise the research instrument and procedures for data collection;
6. Train interviewers/data collectors;
7. Collect data;
8. Prepare for processing of data and, if feasible, do some of the processing; and
9. Prepare a preliminary report.

Guidelines for participants

Modules 19 and 20 can be given to participants as handouts at the end of workshop Part I for their use during the interworkshop period. The content of the modules should be reviewed before they leave for the field, so participants will know what they contain and why they are important.

Module 19 will serve as a checklist as well as a guideline for field activities.

Visit by the facilitator/resource person

The purpose of the visit by the resource person near the beginning of the fieldwork (preferable during interviewers' training or pretesting) is to:

1. Check the progress of the project;

2. Observe the real-life situation in which the project will be implemented, identify problems, and anticipate pitfalls;

3. Review the proposed methodology for data collection and, if possible, assist with training the interviewers and the pretest;

4. Advise on modifications or adaptation of the research design, sampling, and data-collection procedures; and, if necessary,

5. Assist in obtaining managerial support.

Note:

More detailed guidelines for the supervision of **fieldwork** are provided in the Trainer's Notes of **Module 19**.

V. EXAMPLES OF COURSE BUDGET, COURSE SCHEDULE, AND HANDOUTS FOR PARTICIPANTS

Guidelines for budgeting for an HSR training course

The following items will probably have to be budgeted. Indicate for each item who will cover the cost (ministry of health or donor, for example). Salaries of local participants and transport are usually provided by the ministry of health, whereas accommodations and meals are usually covered by the donor.

1. Accommodation and meals

Board and lodging or lodging and an allowance for meals for:

- 20-25 participants,
- 5 facilitators and occasional resource persons, and
- 2 typists (4 at the end of the workshop)

Make sure the workshop site has available:

- A large conference room,
- Two small meeting rooms, and
- A room for the typists.

Also include:

- **Coffee/tea** for the duration of the workshop, twice a day, for 30-35 people.

Consider the inclusion of:

- **Cocktails** for 50 people, after the official opening.

2. Allowances

You may consider providing pocket money for participants and some type of allowance for trainers/facilitators.

3. Transport

- For facilitators and participants to come to the workshop and return home; and
- For pretesting the methodology, including field visits for four working groups of participants.

4. Supplies

If all duplicating is done using stencils:

- 500 stencils for use during workshop,
- 200 stencils for the final report,
- 34 reams of duplicating paper (500 sheets each),
- 1 ream of typing paper,
- ink for stenciling.

If photocopying is used during the workshop, but the final report is prepared on stencils:

- 10 reams of photocopy paper,
- 24 reams of duplicating paper,
- 200 stencils,
- 2 reams of typing paper,
- ink for stenciling and toner for photocopying.

40 note pads, 40 pens, 40 pencils, 40 rubbers, 40 file holders;

1 box of carbon paper;

35 name tags;

paper clips, staplers, staples, paper hole punchers, scissors, chalk, sticky stuff, cellotape;

200 overhead sheets, markers;

5 flip charts, markers.

Examples of course schedules

EXAMPLE OF A COURSE SCHEDULE
(used in southern Africa)

Designing and conducting HSR projects: proposal development and fieldwork

Date/Time	**Session**	**Responsible person(s)**
Date (Sunday)		
Evening	Welcome address	Course coordinator
(1 hour)	Mutual Introduction of participants and facilitators	
Date (Monday)		
0830 - 0915	Opening ceremony	
0915 - 1000	Administrative remarks	Course coordinator
	Module 1: Course orientation	Facilitator
1000 - 1030	Tea	
1030 - 1130	**Module 2: Introduction to health systems research**	Facilitator
1130 - 1245	**Module 3: Identifying and prioritizing problems for research** (including exercise)	Facilitator
1245 - 1400	Lunch	
1400 - 1600	Project group work	
1600 - 1630	Tea	
1630 - 1730	Group reporting in plenary	
Date (Tuesday)		
0800 - 0900	**Module 4: Analysis and statement of the problem**	Facilitator
0900 - 1230	Project group work (including tea)	
1230 - 1330	Lunch	
1330 - 1430	Group reporting in plenary	
1430 - 1500	**Module 5: Review of available literature and information**	Facilitator
1500 - 1530	Tea	
1530 - 1730	Project group work	
evening	Structures and mechanisms for HSR in ... (host country) (optional)	

Date (Wednesday)

0800 - 0830	**Module 6: Formulation of research objectives**	Facilitator
0830 - 1030	Project group work	
1030 - 1100	Tea	
1100 - 1130	Exercise: assessing the statement of the problem and the objectives formulated by another group	
1130 - 1245	Group reporting in plenary	
1245 - 1400	Lunch	
1400 - 1500	Project group work: adjustment of objectives and analysis diagram	
1500 - 1530	Tea	
1530 - 1545	**Module 7: Introduction to HSR methodology**	Facilitator
1545 - 1700	**Module 8: Variables** (including exercise)	Facilitator
1700 - 1800	Project group work	

Date (Thursday)

0800 - 0930	Project group work (continued)	
0930 - 1030	Group reporting in plenary	
1030 - 1100	Tea	
1100 - 1215	**Module 9: Study type**	Facilitator
1215 - 1330	Lunch	
1330 - 1430	**Module 10A: Overview of data-collection techniques**	Facilitator
1430 - 1530	Exercise	
1530 - 1600	Tea	
1600 - 1700	Project group work	
1700 - 1800	Group reporting in plenary	

Date (Friday)

0800 - 0900	**Module 10B: Design of interview schedules and questionnaires**	Facilitator
0900 - 1300	Project group work (including tea)	
1300 - 1400	Lunch	
1400 - 1430	**Module 10C: Focus group discussions** (optional)	Facilitator
1430 - 1730	Project group work (continued)	

Date (Saturday)

0800 - 0915	**Module 11: Sampling**	Facilitator
0915 - 1215	Project group work (including tea)	
1215 - 1245	Exercise: commenting on sampling procedures and sample size of another group	
1245	Lunch	

Date (Monday)

0800 - 0930	Plenary presentations and discussion of sampling procedures and sample size
0930 - 1200	Exercise (Module 10B): Commenting on the data-collection tools of other groups (including tea)
1200 - 1300	Plenary discussion of data-collection tools (2 groups)
1300 - 1400	Lunch
1400 - 1500	Plenary discussion (continued, 2 remaining groups)
1500 - 1530	Tea
1530 - 1730	Project group work: Revision of data-collection tools

Date (Tuesday)

0800 - 0845	**Module 12: Plan for data collection**	Facilitator
0845 - 1130	Project group work (including tea)	
1130 - 1230	Group reporting in plenary	
1230 - 1400	Lunch	
1400 - 1430	**Module 14: Pretesting the metholology**	Facilitator
1430 - 1600	Project group work to prepare pretest	
1600 - 1630	Tea	
1630 - 1730	Project group work to finalize all data-collection tools	

Date (Wednesday)

0800 - 0915	**Module 13: Plan for data processing and analysis** (including exercise, part 1-4)	Facilitator
0915 - 1230	Project group work (including tea)	
1230 - 1400	Lunch	
1400 - 1530	Group reporting in plenary	
1530 - 1600	Tea	
1600 - 1730	Project group work to revise first part of the research proposal (Statement of the Problem, Literature Review)	

Date (Thursday)

0800 - 1300	Pretest
1300 - 1400	Lunch (if necessary packed lunch)
1400 - 1730	Project group work: evaluation of pretest and revision of data-collection tools

Date (Friday)

0800 - 0900	Group reporting in plenary of results of pretest	
0900 - 0930	**Module 15: Work plan**	Facilitator
0930 - 1300	Project group work (including tea)	
1300 - 1400	Lunch	
1400 - 1415	Exercise (optional)	
1415 - 1515	Group reporting in plenary	
1515 - 1545	Tea	
1545 - 1615	**Module 18: Finalizing and reviewing the research proposal**	Facilitator
1615 - 1730	Group work	

Date (Saturday)

0800 - 0845	**Module 16: Plan for project administration, monitoring, and utilization of results**	Facilitator
0845 - 1030	Project group work	
1030 - 1100	Tea	
1100 - 1200	Group reporting in plenary	
1200	Lunch	

Date (Monday)

0800 - 0845	**Module 17: Budget**	Facilitator
0845 - 1230	Project group work (including tea)	
1230 - 1400	Lunch	
1400 - 1530	Group reporting in plenary	
1530 - 1600	Tea	
1600 - 1730	Project group work: Finalizing research proposals	

Date (Tuesday)

Whole day	Project group work: Finalizing research proposals

Date (Wednesday)

0800 - 0815	**Module 19: Fieldwork activities**	Facilitator
0815 - 0830	**Module 20: Preparing a preliminary report**	Facilitator
0830 - 1300	Project group work: Finalizing research proposals (including tea)	
1300 - 1400	Lunch	
1400 - 1430	Evaluation of the workshop	
1430 - 1445	Closing of the workshop	
1445 - 1730	Project group work: Finalizing research proposals	

SAMPLE OF A COURSE SCHEDULE
(used in Malaysia)

Designing and conducting HSR projects: proposal development and fieldwork

Date/Time	Session	Persons Responsible
Date (Monday)		
08:00 - 09:00	Registration	Course coordinator
09:00 - 10:00	Opening ceremony	
10:00 - 10:30	Tea	
10:30 - 12:45	**Module 1: Introduction and orientation to the course**	Course coordinator
12:45 - 14:00	Lunch	
14:00 - 16:15	**Module 2 Introduction to health systems research**	Facilitator
Date (Tuesday)		
		Facilitator
08:00 - 08:15	Review of Module 2	
08:15 - 10:15	**Module 4: Analysis and statement of the problem**	Facilitator
10:15 - 10:30	Tea	
10:30 - 12:45	Project group work: - Analysis of problem - Formulation of problem statement	Facilitators and Technical resource persons
12:45 - 14:00	Lunch	
14:00 - 16:15	Project group work (continued)	Facilitators and Technical resource persons
Date (Wednesday)		
	Review of Module 4	
08:00 - 08:15		Facilitator
08:15 - 10:15	Plenary: Presentation and critique on problem analysis and statement	Facilitators and technical resource persons
10:15 - 10:30	Tea	
10:30 - 11:30	Plenary (continued)	
11:30 - 12:45	**Module 5: Literature review**	Facilitator
12:45 - 14:00	Lunch	
14:00 - 15:00	**Module 6: Formulation of research objectives**	Facilitator
15:00 - 16:15	Project Group work: - Formulation of research objectives	Facilitators
16:30 - 17:00	Facilitator group meeting	All facilitators

Date (Thursday)

08:00 - 08:15	Review of Modules 5 and 6	Facilitator
08:15 - 10:15	**Module 7: Introduction to HSR methodology** **Module 8: Variables**	Facilitator
10:15 - 10:30	Tea	
10:30 - 12:45	Project group work: Selection of variables	Facilitators
12:45 - 14:00	Lunch	
14:00 - 16:15	**Module 9: Study type I**	Facilitator
16:30 - 17:00	Facilitator group meeting	All facilitators

Date (Friday)

08:00 - 08:15	Review of Modules 8 and 9	Facilitator
08:15 - 10:15	**Module 9: Study type II**	Facilitator
10:15 - 10:30	Tea	
10:30 - 12:15	**Module 10A: Overview of data-collection techniques**	Facilitator
12:15 - 14:45	Lunch	
14:45 - 15:45	Project group work: Study design	Facilitators
15:15 - 16:15	Plenary: Presentation and critique on objectives, variables, and study design	Facilitator/Lecturer Facilitators
16:30 - 17:00	Facilitator group meeting	All facilitators

Date (Saturday)

08:00 - 08:15	Review of Modules 9 and 10	Facilitator
08:15 - 10:15	**Module 10B: Construction of questionnaire**	Facilitator
10:15 - 10:30	Tea	
10:30 - 12:45	Project group work: Construction of instruments	Facilitators

Date (Monday)

08:00 - 08:15	Review of Module 10B	Facilitator
08:15 - 10:15	**Module 10C: Focus group discussion**	Facilitator
10:15 - 10:30	Tea	
10:30 - 12:45	Exercise on focus group discussion	Facilitator
12:45 - 14:00	Lunch	
14:00 - 16:15	**Module 11: Sampling**	Facilitator
16:30 - 17:00	Facilitator group meeting	All facilitators

Date (Tuesday)

08:00 - 08:15	Review of Modules 10 and 11	Facilitator
08:15 - 10:15	Project group work: Sampling and sample size	Facilitators
10:15 - 10:30	Tea	
10:30 - 12:45	**Module 13: Plan for data processing and analysis**	Facilitator
12:45 - 14:00	Lunch	
14:00 - 16:15	Project group work: Plan for data processing and analysis	Facilitators
16:30 - 17:00	Facilitator group meeting	All facilitators

Date (Wednesday)

08:00 - 08:15	Review of Module 13	Facilitator
08:15 - 10:00	Plenary: Presentation and critique on sampling, sample size, and plan for data analysis	Facilitators
10:15 - 10:30	Tea	
10:30 - 12:45	**Modules 12, 15, 16 & 17: Management of research project (data collection, work plan, project administration and budget)**	Facilitator
12:45 - 14:00	Lunch	
14:00 - 16:15	Project group work: Management of research project	Facilitators
16:30 - 17:00	Facilitator group meeting	All facilitators

Date (Thursday)

08:00 - 08:15	Review of Modules 12, 15, 16, and 17	Facilitators
08:15 - 10:15	Plenary: Presentation and critique on management of research project	
10:15 - 10:30	Tea	
10:30 - 11:45	Module 17 (continued): Management of research project (sources and procedures for funding)	Facilitator
11:45 - 12:45	Project group work: Project proposal (see Module 18)	Facilitators
12:45 - 14:00	Lunch	
14:00 - 16:15	Project group work: Project proposals	Facilitators
16:30 - 17:00	Facilitator group meeting	All facilitators

Date (Friday)

08:00 - 10:15	Plenary: Presentation and critique on project proposals	Facilitators
10:15 - 10:30	Tea	
10:30 - 12:15	Plenary (continued)	Facilitators

12:15 - 14:45	Lunch	
14:45 - 16:15	Group work: Review of project proposals	Facilitators
16:30 - 17:00	Facilitator group meeting	All facilitators

Date (Saturday)

08:00 - 08:15	Briefing for panel members	Course coordinator
08:15 - 10:00	Plenary: Presentation of project proposals	Panel members and facilitators
10:00 - 10:30	Tea	
10:30 - 12:45	Plenary (continued)	Panel members and facilitators
12:45 - 13:00	Evaluation of workshop	Facilitator
13:00	Closure of part I workshop	

Information circular for course participants (used in Malaysia)

Background

Health Systems Research (HSR) has been identified as an important tool to provide managers with information they can use in decision-making processes aimed at improving health care. In this context, "managers" could be those responsible for planning or implementing health programs at all levels of the health system or those responsible for managing hospitals, or clinical outpatient services in hospitals, clinics, etc.

Objective

The aim of the workshop is to enable you to develop and implement HSR projects aimed at assisting managers to improve the effectiveness and efficiency of health care.

Expected outcome and future functions

Once you have successfully completed the workshop, you will be expected to incorporate the conduct of HSR into your regular duties. As staff members who have had training in research, you will design and supervise projects and train your staff to collect data, analyze it, etc. You will also serve as "resource persons" for your programs, provinces/states, hospitals, etc., and provide assistance with the analysis of problems, design of studies, preparation of study reports, etc.

Research skills can be acquired only through real life practice. Therefore, this training program is designed to give both theory as well as practical experience in conducting research. The practical experience will be in the form of a project that will be carried out in your place of work as a supervised training exercise. The workshop will be conducted in a series of sequential parts with an interworkshop period during which the practical data collection will be completed.

The **structure of workshop** will be:

1. **Preworkshop assignment**
   - Background reading, and
   - Selection of a suitable problem for the research training project (optional).
2. **Part I (2-2½ weeks)**
   - Design of the research proposal, and
   - Design of research instruments.
3. **Fieldwork period (maximum of 30 working days over a period of 5-6 months)**
   - Collection of data. (This will be done at the place of work of each participant and will be done in conjunction with her or his other duties.)

4. Part II (2 weeks)

- Analysis of data,
- Preparation of report,
- Presentation and discussion of findings.
  (The respective state or program directors will attend these presentations and participate in the discussions.)

Background reading

This workshop will be very intensive and you will need to do a considerable amount of background reading both before and during the workshop. Preworkshop reading consists of __ papers. (Select relevant short papers on the concept and purpose HSR.)

Selection of projects for the training exercise

Development and implementation of a research project will be the most important part of this training program. The first step in doing research is to select a problem that is an appropriate topic for research. You will have to do this **before** you come to the workshop.

One of the basic principles of HSR is that research should focus on **priority problems**. Although the project that you will do during the workshop will be designated as a training exercise, the only difference from any other real-life project will be that the scope might have to be limited to enable you to complete the project before the part II workshop. Therefore, the problems that are selected should conform to all the criteria that would be used in selecting projects for research, and the process of selection should be the same as in actual practice.

We suggest that you meet with your state or program director to identify one or two priority problems that **need additional information through research**. (Note: If sufficient information is already available either through routine data or from other studies, it is *not* suitable for a research project, even if the problem is a priority.)

Criteria for selecting a problem for research include:

- Is the problem a priority?
- Is the problem specific and can it be clearly stated?
- Can the research be carried out with the available resources?
- Will the research findings contribute important information that can be used to solve the problem?
- Is it likely that the recommendations of the study will be applied?
- How urgently are the results needed for making a decision?

Preparation for the project

Before coming for the workshop, you should be able to answer the following questions regarding the problem that you will be focusing on in your research:

- What type of information will assist managers in making decisions regarding the problem? For example:
    - The causes of the problems?
    - The factors contributing to the problems?
    - The relative importance of various factors?
    - The comparative effectiveness of various solutions?

- Can existing statistics be analyzed to provide part or all of the information needed? Does new data need to be gathered as well?

- How will managers use the information when they receive it? (i.e., What actions will the manager be able to take based on the results?)

- Can the research provide the type of information the manager needs?

Available data on the problem

- Collect and bring to the workshop all available statistical data, copies of circulars and guidelines, and any other available data on the problem that you will be investigating. This will help you prepare your research protocol.

- Also visit the health centres, hospitals, and other sites where you may eventually be collecting data for this project and familiarize yourself with their systems of keeping registers, cards, appointment books, etc., so that you will know how to select the sample for your research project.

Personnel for data collection

Identify members of your staff such as nurses, medical assistants, health inspectors and the like who can assist you in collecting data for your research project during the implementation period. You will need this information to help you determine how much data you can collect within the given time period.

Reply form for participants

WORKSHOP: DESIGNING AND CONDUCTING HEALTH SYSTEMS RESEARCH PROJECTS

1. Name of participant: ____________________

2. Position: ____________________

3. Mailing address: ____________________

4. My previous experience in health research is the following: ____________________

____

____

5. I am able to attend workshop part I and part II of the course and to participate in the fieldwork.
____ Yes ____ No

6. The research project(s) that may be considered as a training exercise during the workshop is/are:

____

____

____

____

7. Other participants who will work on the same project during the workshop include:

____

____

____

I support the above project.

____
Signature of officer in charge

____
Signature of Participant

____
Position

Evaluation form

Evaluation questions: HSR Training Workshop in ....

1. **Have the objectives of the workshop been achieved?**

    1.1 Have you gained the expertise to develop a research proposal?

    1.2 Have you developed a proposal that you think can be carried out as a group within the coming 5 months?

    1.3 Do you feel (1) motivated and (2) confident to start other small research projects in the future in your own working situation?

2. **Do you have any comments on the course content?**

    Would certain parts need extension?

    Could certain parts be slimmed down?

    Were the presentations clear enough?

3. **What is your opinion of the training methods used in the workshop** (compared, for example, to the "lecture" type of teaching)?

4. **Did you find the division of time between lectures, group work and plenary satisfactory** or would you propose more or less time for any of these three components of the course?

5. **Were you satisfied with the type of assistance provided by the facilitators?**
Would you have any suggestions for similar courses in the future?

6. **How did you function as a group?**

Do you feel that every group member had an equal chance to gain from and contribute to the course?

Would you have any suggestions for similar courses in the future?

7. Acknowledging that you are all busy people, but that the course was quite compact:
Would you have liked the duration of the course longer, shorter or was it the right length as it was?

8. **What is your opinion on the organization/accommodation/working conditions of the course?**

Do you have any suggestions for the next workshop in this respect?

9. ANY OTHER COMMENTS (use back of page)

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ABOUT THE AUTHORS

Corlien M. Varkevisser, PhD, MPH, is a medical sociologist-anthropologist by profession who specialized in public health. As a staff member of the Royal Tropical Institute, Amsterdam, and former head of the Primary Health Care (PHC) Unit, she has gained extensive experience in health systems research and PHC management in sub-Saharan Africa. She is one of the coinitiators of the Joint HSR Project (WHO/Netherlands Ministry for Development Cooperation/Royal Tropical Institute) for southern Africa and has been based at the WHO subregional office in Harare as manager of the Joint HSR Project since its onset in April 1987.

Indra Pathmanathan, MMBS, MPH, is a physician specializing in public health who is currently working in the Ministry of Health, Malaysia. She was previously on the academic staff of the University of Malaya. As head of the HSR program in Malaysia since its inception, she has been responsible for developing and implementing several strategies for HSR that have been replicated in other countries. These included training programs in HSR and Quality Assurance for decision-makers in ministries, for physicians, and for others in district health teams, hospitals, and universities. She is a member of the Advisory Group on HSR, WHO-Geneva and serves on the editorial board of BRIDGE.

Ann Brownlee, MA, PhD, is a medical sociologist who specializes in HSR, planning and evaluation, and cross-cultural aspects of health care. She served as Research and Evaluation Coordinator for the Project for Strengthening Health Delivery Systems in West and Central Africa for a number of years, where she worked closely with WHO's Regional Office for Africa and with colleagues from Africa and elsewhere to develop an HSR training and small-grants program and to publish the *HSR Training Course* that was a forerunner of this volume. She currently works as a consultant in international health for groups such as WHO, IDRC, and Wellstart and teaches at the University of California at San Diego.